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Original Contributions.

PREDISPOSITION.

BY J. D. PATTERSON, D.D.S., KANSAS CITY, MO. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, AT ST. LOUIS, MAY, 1905.

This subject is one of absorbing interest to the dental profession, for we often observe clinically the ravages of dental disease without adequate reason, and on the other hand, we see immunity from decay of the teeth and disease of the surrounding structures without apparent reason. We are therefore constantly trying to make plain the contradictory evidence, and in so doing we are irresistibly drawn to the belief that in predisposing conditions we must find much of the solution of the question. And if it can be made plain that many of the predisposing causes of dental disease can be ameliorated—and we believe this is true—then the consideration of the subject becomes a duty we owe to the profession and to our patients.

Predisposition is a condition of the body or of the tissues which disposes them to the action of disease under the application of an exciting cause. This condition is one in which perverted cells and tissues and juices of the body are inherited, or in which improper cell metabolism may have been acquired by persistent and continued violation of the laws of proper living. The tissues are thus in a condition of "lessened resistance" to irritation, whether traumatic or infectious. This lessened resistance of the cell is due to abnormal quality or disposition or innervation of the protoplasm of the cell, which interferes with its spontaneous or ameboid movement and life, which destroys or lessens its ability to take in food and to grow, to develop and to reproduce itself. Thus the tissue becomes "starved," and in this condition none of the tissues suffers more than those of the oral cavity; indeed, the oral mucous membrane, the tongue and the secretions of the oral cavity

are standard indicators in making diagnosis in nearly all ailments of the human body. In the predisposed condition, when we have inflammatory conditions in the oral cavity, certain prescribed and standard treatment seems at times to have little effect, while again the relief is instantaneous, and careful observation shows that tissue conditions control, limit or assist the curative efforts of the operator. The tissue has come into being perhaps under different conditions of nutrition in its formative stage; some lack of force has made imperfect tissue, imperfect bone, imperfect enamel—imperfect armor to fight off disease—and when irritation comes it gives up without a struggle. The dental surgeon daily observes this in caries, in pulp irritation, in alveolar abscess, in stomatitis, in pyorrhea, in antrum inflammation, in necrosis and in oral tumors.

In order to intelligently serve humanity through dental services the practitioner should be an adept in physical diagnosis. When we know that each patient is liable to present conditions predisposing to and preventing the cure of existing trouble, the dentist should be able to read the signs and symptoms, so that he may know what course to pursue. This is the especial point to which I desire to direct your attention in dealing with the subject of "Predisposition." We must know if the abscess will go slowly to a cure, and if drainage must be left open longer than usual; we must know whether the patient's condition will not rebel at immediate root-filling after extirpation; we must know if there is a disposition to hypertrophy in the treatment of all abnormal growths; we must know whether to cut out necrosed bone or to wait for its sequestrum. We should also be able to judge the effect of the therapeutic remedies, for be it known that the unusual and alarming effect of remedies even locally applied is dependent solely upon depraved tissue conditions. The "idiosyncrasy" against certain drugs shows undeniably that the tissue is "out of joint." The dentist should be able to diagnose the possible serious effects from anesthetics, both systemic and local, and should carefully guard against the occurrence, which may come to any of us, in serious collapse. My observation is that the surgeon who comes to our aid in the administration of anesthetics is too careless, and he also will advise the giving of nitrous oxid and cocain injections too indiscriminately. So I say that for self-protection we should be able to make a good physical diagnosis ourselves, not only in minor dental operations,

but in those where we call a surgeon and give the life and death problem into his hands.

It is needless for me to go into any description of the means for ascertaining the proper heart action, the respiration, etc., etc.—only to advise that the dentist should be perfectly able to do this and note any predisposition against the use of anesthetics, general or local. Nor is it necessary even to describe well-known methods for detecting slighter predispositions. Volumes have been written upon the subject, and I will only briefly touch upon methods that may be employed by the busy dentist and upon cases in my own experience. In the practice of the day the most troublesome character of cases with which I come in contact are the patients who are harassed by the modern methods of life—the business man with overworked brain; the society girl or woman, overtaxed with the various forms of neurasthenia that come as the result of violating natural laws until the nervous force is exhausted, digestion and assimilation are deranged and the secretions abnormal. In this condition they are an easy prey to the various forms of dental disease, especially stomatitis and pyorrhea. The whole system is in an anemic condition; the saliva is ropy; food and foreign matter cling to tooth surfaces and fermentation is rife; the cervical portion of the teeth is sensitive; calculi deposits rapidly accumulate, and the patient is in such a touchy condition that the operator is in despair. This is the neurasthenic. It is not always the result of improper hours or of dissipation; it is often the result of mental worry, which is a disease factor of no little consequence and now becoming considered of great importance. The treatment of these patients so afflicted is indeed a delicate task. Rough and peremptory manners and methods must give place to the rational and sympathetic. The patient has imaginary pains; they must not always be made light of. First carefully and methodically correct the unhygienic condition by removing every possible source of irritation. With these patients this must be done a little at a time, then institute a set of rules that the patient must studiously follow. It is simply astonishing to see how the ropy saliva will disappear, the disagreeable odors vanish, and decay, gingivitis and sensitiveness at the cervical border be known no more. This treatment should of course go hand in hand with the physician's treatment restoring tonicity (I refer only to the local). If the neurasthenic

patient cannot abide permanent operations, then make temporary ones and tide over the difficulty. Now these patients are not always those who have acquired this condition which so predisposes to dental disease. It comes as a heritage from progenitors. Disease is *not* inherited, but tissue characteristics *are*, and if environment is favorable predisposition to dental disease will soon appear. In either case the local treatment is *vigorous* hygienic treatment.

Another grave predisposition to dental disorders is found in the man or woman who is addicted to the habitual use of alcoholic beverages, and especially is this true of pyorrhea. The state of alcoholism seems to rapidly deprive the gum tissue of the strength to withstand the irritation from the slightest calcic deposit, and in the treatment of such patients double the pains must be taken for perfection of detail. The same is true when such patients suffer from abscess, diseased antrum or any of the kindred dental ills.

The faulty metabolism productive of Bright's disease is a fruitful source of dental predisposition. In this as with neurasthenia and alcoholism, the slightest irritation becomes at once a disease. The patient is also fretful, complaining of the pain caused, and must receive our most careful consideration. So with the gouty and rheumatic diathesis. All dental lesions involving an inflammatory character must be treated, remembering that we are dealing with tissue that is predisposed to dental irritation, and exercise the most extreme care that every factor of irritation be removed or reduced to the lowest possible limit.

The subject of this paper has a wide range, and I have covered only a small portion of it, and that portion to which recent cases in practice have guided me. I have had in mind: First, that we meet patients daily who are very much predisposed to dental irritation. Second, that pathologic conditions in these cases should receive the extremest care; the usual care will not suffice because the prognosis is bad. Third, that we should be able to recognize the physical signs of predisposition whenever they present, and that in dealing with predisposition from nervous prostration from whatever cause we should remember that those patients are entitled to our most careful consideration. The insane of all civilized nations are held immune from all criticism, and verily, some of our neurasthenic patients deserve equal consideration, for they are only a step from insanity.

DEVELOPMENTAL PATHOLOGY AND TOOTH DECAY.

BY EUGENE S. TALBOT, M. S., D. D. S., M. D., LL.D., CHICAGO. READ BEFORE THE MASSACHUSETTS STATE DENTAL SOCIETY, AT BOSTON, JUNE, 1905.

There is a fascination about theories which exploit a single etiologic factor that carries away a large class of minds unaccustomed to analytic thinking and indisposed to intellectual exertion. For the same reason such theories are apt to be received with extreme skepticism by minds accustomed to analyzing the results of research. This last mental attitude is apparent among scientists of the dental profession in regard to the lactic acid theory of tooth decay, so eloquently presented by Miller of Berlin. The solution of the problem was too disappointingly simple. It bore ominous resemblance to many exploded one-sided solutions of etiology which have won the admiration of minds slovenly neglectful of analysis since inductive philosophy began to dominate. Like these exploded etiologic theories, the lactic acid theory had an attractive aspect and a superficial semblance of facts in its favor. Furthermore, it played to the sociologic reformer whose God is parsimony, by furnishing materials for an onslaught on candy. The skepticism which the theory produced was strongly in evidence in the remarks of Black and Truman, in the discussion of Miller's paper at the Fourth International Dental Congress.

The rule governing the adoption of any working hypothesis is the simple absolute one that it must not only explain all the facts, but must exclude all other explanations. Unless this be the case the hypothesis suggests no remedy capable of dealing with the results alleged to follow the conditions. Given an allegedly simple cause which does not set in action secondary causes, or does not require predisposing factors for its operation, inevitably removal of such cause must be followed by the cessation of its effects. This is particularly true where prophylaxis is so simple as in the case of the lactic acid theory. It is at least a quarter of a century since this theory was announced, yet tooth decay continues its ravages and is much more in evidence than ever. The lactic acid theory in this respect closely resembles the germ theory as revived by Pasteur. At the outset of the revival the germ was alleged to cause everything, but soon it was found that culture

mediums were necessary for its operation, and furthermore, that the chief effects were due to toxins produced by the germ. The whole problem then resolved itself into the etiologic moment of the old clinicians. This etiologic moment consisted of the immediate determining factor serving like a spark to a powder magazine, and the powder magazine consisting of the condition of the patient when born as affected by the development through which he passed, and finally by the condition in which he was at the time the spark was applied. Upon these last would turn his guards against disease given by the state of his leucocytes and his antitoxin-forming organs. What is true of the germ theory was true and is true of any theory by which a single etiologic factor is alleged.

The viewpoint of this lactic acid theory at the outset is defective. It is true that children in civilization eat candy and their teeth decay rapidly, but it is equally true that the negro in the sugar plantation uses prodigious amounts of sugar cane and sugar products, yet retains his teeth to old age. At the outset, therefore, the facts do not fit the theory, but indicate, granting everything that is claimed for lactic acid as an exciting cause, that there exist more potent causes of a predisposing character.

The claim so often made, that a given subject remains despite all seeming hygienic neglect with perfect teeth to an extreme old age, may be granted, yet such an admission proves nothing, since it is notorious that one scion of a defective family gains physical health by the sacrifice of all the higher qualities of the race during the struggle for existence between organs, waged with most intensity before adolescence is completed. The defective family generally contains a large number of scions dying at the various periods of stress in youth. A single selfish animal parasite is long lived whose health is the result of his loss of higher attributes. The negro, like the ape, notoriously sacrifices the powers of higher development at the period of puberty to the necessities of food-getting and reproduction. What is true of the negro and ape is true of all other races between the two extremes. The physical aspect of this is shown in the sacrifice of the dermal bones that eke out the deficiencies of the skull and face formed from the chondrocranium. Proper development of the jaws turns on the proper amount of dermal bone. If this be not furnished the jaws, the

brain and skull may profit, but the teeth and jaws will lose. Proper development of the brain depends on development of the brain itself, not only in its powers as regards sensation and motion, but also in its powers of regulating growth and blood supply. If these last powers be interfered with irregularities of dermal bone development result. Not only that, but proper innervation of the teeth and the bone will fail. The sacrifice of the higher gains of the race to jaw, teeth and reproduction occurs early in the ape, whence the human aspect of the young gorilla as contrasted with the jowl and bestial face of the adult. In the negro the same occurs at puberty, but to a lesser extent. In higher races the same pubertal struggle for existence between jaws, face and reproduction on the one hand and the higher qualities on the other is observable.

The deciduous teeth are, remarks Stanley Hall (Adolescence, Vol. I, p. 77), more primitive in type and the molars are useful in warfare, but suggest a change of food habits and involve greater length of jaw to make room for them and greater strength of muscle. Hence pubertal increase of the lower jaw may be assumed. Increased prominence of the chin, breadth of the lower jaw, propensity to chew, to bite hard things, or to perform feats of strength with the teeth and jaws, the frequency with which clenching the teeth is mentioned in statistics as to anger, which shows a great pubertal development of irritability, teach how clearly jaw tensions, once a chief factor in battles, are still associated with pugnacity. One marked jaw development of this pugnacity was the simian diastema for reception of the cuspids as used for fighting purposes. The space so used was gained at the expense of the teeth, and this diastema loss of jaws and space persisted in man long after the use of the jaw for fighting had disappeared.

This constitutional factor of the periods of stress involved by the struggle for existence between organs, functions and structures, pointed out by Roux (Der Kamp der Theil im Organismus, 1881) nearly a quarter of a century ago as a necessary corollary of the law of economy of growth (Goethe, Aristotle, From the Greeks to Darwin), ruling use and disuse as a factor of development, plays the chief part in developmental pathology, as De Moor (Evolution by Atrophy) has lately shown, and as was pointed out by A. H.

Thompson (Dental Cosmos, Vol. 19, p. 237). Degeneracy or "suppressive evolution," as Thompson called it, is a part of developmental pathology which exerts beneficial or malign influences according as it attacks lower structures for the benefit of higher or sacrifices the higher to the lower. Degeneracy may convert the third eye into a pineal body or may sacrifice the paired eyes to the third eye by creating a cyclops. It may sacrifice brain potentialities to the jaws and jowl, as in the ape, or vice versa, as in higher man. It actually sacrifices liver, kidneys, adrenals, brain and eliminative powers to length of extremities. These factors, so well demonstrated and employed in medicine, are too much neglected in dental pathology, which deals with structures so transitory as to readily fall under their influence. The constitutional factor converting teeth from the megadont to mesodont and even to microdont types excellently illustrates this.

In lieu of the broad consideration necessitated by the results of modern developmental pathology, dental hypotheses are generally "simple" half truths. Lactic acid in the system implies, for example, local imperfect oxidation and elimination. Behind it must therefore lie arrests of development of eliminating and oxidizing organs. The same illogical tendency is apparent in other hypotheses.

While some admit there is a diathesis, they do not believe that tooth structure can be changed by health and disease through the pulp. Some believe there is a difference in the "amount of lime carbonate and phosphate," thus causing a difference in "those salts that are more easily dissolved and those that are dissolved with more difficulty." Others argue that the teeth are degenerating, hence the body or race must degenerate as a whole. As statistics demonstrate that the longevity is increasing from year to year, this cannot be true.

Another class thinks that direct heredity has something to do with tooth decay, but is startled by finding that the parents of a child who has poor teeth have excellent teeth. Others argue that the aborigines lived upon coarse and simple food, while at the present day foods are prepared and of greater variety. This theory ignores the necessary changes of environment, and the fact that the Scotch have lived for centuries upon oatmeal gruel,

and the Chinese, Japanese, Malays and Polynesians live upon prepared rice, and yet have a high quality of tooth structure.

Another says, "We should select our food more carefully, with a view as to its value as a tooth builder rather than the pleasure it gives the palate." He is, however, unable to suggest any method or food that will meet this indication. According to another, "Indigestion is far more often produced by defective teeth, which prevent proper mastication," yet the Scotch, the Chinese, the Japanese, the present method of bringing up children, caring for the sick, etc., show that the teeth are not necessarily required for mastication. These do not have indigestion despite the fact that they live upon soft food.

According to another, caries is localized in places where there is no friction and where the enamel is thick, but decay often takes place upon the cusps of all the teeth, where the enamel is the thickest, and upon the buccal and lingual surfaces, where friction is always present.

Decay of the teeth is more common among defectives in state and private institutions than among normal people. If further evidence in regard to tooth decay and tooth degeneration be desired, compare the teeth of the upper and lower jaw. Arrest of development of the upper jaw is more common than of the lower, owing on the one hand to the upper's fixed attachment to the other bones of the skull under the law of economy of growth, and on the other hand to the mobility of the lower. Hitchcock, Magitot and others have found decay of the teeth more frequent in the upper than in the lower jaw. The checking influences of the nervous system which produce arrest of development of a jaw bone must affect the embryonic structure of the teeth, hence the more frequent decay in the upper than the lower jaw. Decay of the teeth is more common in arrested jaws where the teeth are irregular than in well-formed jaws and teeth. The lower jaw being movable, more blood is sent to the part and the bone is less liable to become arrested. The same fact explains why there is less decay of the teeth in the lower jaw, as the vitality of the structure is greater.

Some English dentists have lately attributed the rapid decay of the teeth to the modern methods of manufacturing flour at the Minneapolis mills, ignoring the fact that teeth decayed nearly or

quite as rapidly when the wheat was ground by the old-fashioned and slower process. Each of these suggestions has some value, but they are not far-reaching enough to account for all conditions.

More than two decades ago I laid stress upon the fact that tooth degeneration or decay was a natural process which came under the law of economy of growth, which is the law underlying developmental pathology. No organs of the body illustrate the law of use and disuse of structures so well as the teeth. Once they were all-important for the life of the animal, but now man may live three decades beyond three score and ten without them.

The cone-shaped tooth found in the reptilian type and in toothed birds is the primitive tooth (Osborn). These were in the first place organs of the skin which developed over the surface of the body. They were well nourished through the pulp. The teeth of the shark first departed from the primitive type, since they did not develop upon the surface, but deep down in the tissues. These changes in tooth evolution were for the benefit of the animal. This method of tooth formation, converting epithelial cells without vascular supply into enamel rods, is a ready degeneration of the cells for the body's benefit.

Degeneration or its ultimate decay, as I have called it in my lectures and papers, progresses with change in the shape of the tooth from the cone. Two theories are advanced as to the method of evolution from the cone tooth to the bicuspid and molar—the concrescence theory by Magitot and the differentiation theory by Osborn. So far as this article is concerned, it makes no difference whether the primitive cone teeth group themselves in twos or fours to form bicuspids and molars, or the single cone tooth gives off shoots or buds to form cusps and roots. As the vertebrates develop into higher organisms mixed sets of teeth are necessary for the habits and convenience of the animal. These are divided into incisors, cuspids, bicuspids and molars.

Under the law of economy of growth, the face and jaws and teeth change according to the environment of the animal. Living in the open air upon primitive coarse foods obtained and prepared by the mouth, large jaws and good sound teeth prevailed. The function of the alimentary canal was performed suitably with the environment. Extreme as was the change from the holding cone-shaped tooth to that of the masticating bicuspid and molar,

the bell-shaped crown, with thick, well-formed enamel for grinding and crushing, was conducive to health.

Tooth decay necessarily goes hand in hand with rise in evolution. This evolution is a race for supremacy between the man of brawn and the man of brain. The teeth of the anthropoid apes are large at their sockets and the crowns taper to sharp cusps; the cuspids are prominent, taking the type of the carnivora. In the lower races a slight change occurs, the roots of the teeth are closer together, the necks smaller, the crowns broader. In the higher races the roots are still closer together, the alveolar processes longer and thinner, the necks of the teeth smaller, the crowns smaller and less bell-crowned, and their sides straighter.

Between these two descriptions the teeth of man have reached the highest physical development in evolution both as to quality and number. The perpendicular line between the brain development and facial atrophy in face evolution has now been crossed, and pathologic conditions of the teeth and jaws necessarily begin. The brain has developed at the expense of the jaws and teeth under the law of economy of growth. Man reached his highest physical development when he had thirty-two well-formed teeth. The continued recession of the jaws no longer permitted thirty-two teeth, and they are now being dropped, commencing at either end of the jaw. The third molar and lateral incisor are growing smaller. The shark, certain reptiles, toothed birds, many marsupials, and some mammals have as many as seventy-two teeth. Advance along the line of higher types is made by dropping teeth in front and behind.

While these changes are progressing tooth structure is degenerating in density, thickness and quality. Pits, furrows and grooves in the enamel and interglobular spaces in the dentin are the rule. People with unstable nervous systems suffer to the most marked degree. Other evidences of jaw and tooth degeneration in muscles and their attachment have been observed. Retraction of the upper lip in anger, uncovering the cuspids, is an atavism, since it is present in all carnivora preceding combat, whence its marked condition at puberty. Harrison Allen pointed out that the alveolar borders tended to parallelism in savages, while in civilized races the height of the anterior alveolar border was greater than in the vicinity of the molars, from degenera-

tion of the platysma myoides muscle. Jaw muscles and their attachments are much smaller in modern than in early races, and Ward found the lower jaw much lighter in civilized races.

The struggle for existence between the jaws and teeth is not always harmonious. Arrests of jaw take place, owing to an unbalanced nervous system, and the teeth do not become arrested in proportion, although their shapes change from broad, large crowns to narrow cone-shaped crowns. This is tooth degeneration. In most cases diminution in size of the dental arch does not keep pace with the arrested jaws and irregularities of the teeth result, or the third molars become impacted between the second molar and ramus. Pits and fissures are now observed in the enamel and interglobular spaces in the dentin.

The skulls of ancient Egyptians, Greeks, Roman soldiers, Etruscans, Phœnicians, ancient Lake Dwellers of Switzerland, Firbolg, and prehistoric skulls from the Ireland bogs, Peruvians, ancient Hawaiians, Cliff Dwellers and Mound Builders, all show incipient decay. When decay is found it is in the sulci of the crowns, and very rarely if ever at any other point. If such a condition should occur, the starting point would be in the sulci where the enamel is defective. In most cases only a dark line is observed in these fissures. The enamel is so perfect, thick and dense that decay is almost impossible. The only faulty developed tooth structure is located at the weakest part of the enamel, the sulci. The same conditions are observed when decay is found in the teeth of animals, as the fissures are the first to be diseased. In modern races, owing to faulty development, decay may occur at any point, not excepting the cusps, as well as in the fissures of the teeth. The more advanced the race is in civilization, the greater is the mental development, with the greater local degenerations.

A class of cases which have come under observation are as follows—Children of strong, healthy constitution may erupt all their permanent teeth, anterior and including the first permanent molars, with fairly good enamel and with little or no decay. At seven, eight or ten years of age, after one or more of the eruptive fevers, the second permanent molars erupting have faulty enamel in the sulci and at the buccal pits. Decay may take place within a year, and the cavities starting in the sulci and in the buccal pits may be so large as to meet. The enamel and dentin are very soft

in these teeth, showing conclusively that the constitutional diseases affected the enamel and dentin through the blood streams and nerve endings before the teeth erupted. The modern etiquette (munching the food with the lips closed and without mastication, and cutting the food with the fork instead of the knife) is bringing about a greater change in evolution under the law of economy of growth or use and disuse of structures than any other one thing. The teeth of this class under the microscope show fissures and defects throughout the enamel. (I have examined the enamel of teeth under the microscope sufficiently to warrant my conclusions, and have only to refer you to the beautiful specimens of defective enamel illustrating the paper of Miller read at the Fourth International Dental Congress, and "Is There Uncalcified Tissue in the Enamel?" by Douglass E. Caush, published in the February, 1905, *Dental Cosmos.*) Here then are the great underlying causes of tooth decay, namely, "want of tooth resistance" from within, disuse, and tooth degeneration along the line of evolution and disease. (Talbot: Constitutional Causes of Tooth Decay, DENTAL DIGEST.)

RESUMÉ.

1. Few dentists have had proper analytic training.

2. A broader education is necessary to practice stomatology successfully in the future.

3. Pathology of the head, face, jaws and teeth must be studied along broader lines.

4. In the evolution of man the face, jaws and teeth are sacrificed for the benefit of the brain.

5. Degeneracy or suppressive evolution, as Thompson calls it, is a part of developmental pathology, which exerts beneficial or malign influence according as it attacks lower structure for the benefit of higher or sacrifices the higher to the lower.

6. It may sacrifice brain potentialities to the jaws and jowl, as in the ape, or vice versa, as in higher man.

7. The teeth decay more rapidly in pregnancy and constitutional diseases, especially in those cases where the nervous system is involved.

8. The teeth of primitive races decay, but the starting point is always where the enamel is defective.

9. Decay of the teeth is commoner in arrested jaws than in those well developed.

10. Decay is more common in the teeth in the upper jaw than in the lower.

11. Jaw and tooth degeneration under the law of economy of growth, whereby a structure is lost for the benefit of the organism as a whole, is the greatest determining cause of tooth decay. Without it lactic acid ferment would act rarely, if at all.

12. Lactic acid ferment is an exciting cause of tooth decay in man's evolution.

13. Tooth decay naturally occurs hand in hand with rise in evolution.

14. Rise in evolution means increased control by the central nervous system of local nerves, whether of growth, sensation or motion, so that explosive performances do not occur as in lower types. Resultant disuse by the local nerves of function results in lessened nutrition. The jaws and teeth being variable structures are most affected by control of local trophic, sensory or motor nerves, since it is in unstable variable structures that explosive excess is most apt to occur.

MEDICAL RELATIONS OF CERTAIN CONDITIONS OF THE MOUTH.

BY L. DUNCAN BULKLEY, A.M., M.D., NEW YORK. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, 1905, AND PUBLISHED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

Although not specially occupied with disease of the mouth, I have such frequent occasion to inspect the oral cavity in connection with dermatologic practice, that I have become very much interested in the subject. It also happens that many cases of disease of the tongue, gums and buccal mucous membrane are sent to me, and many occur in my own practice.

The mouth occupies a very prominent place in the economy as the point of entrance of food, and I need not dwell on the importance of having it and all within it in a proper condition.

Few, among the laity at least, recognize fully the essential part which is played by the mouth and its appendages in the process of digestion, and consequently in the life and health of the individual. Mastication and proper insalivation are the first steps in digestion, and undoubtedly much ill health often results from the improper manner in which these are performed. I am convinced from long observation that hurried eating, imperfect mastication, soft food, and the taking of fluid while eatables are in the mouth, are fertile sources of trouble. This is a matter concerning which physicians and dentists should educate their patients. In this connection dentists render incalculable service in placing the teeth, whether natural or artificial, in a condition suitable for their important work. As an illustration from the animal world, I would refer to the sometimes marvelous effects in poorly-nourished horses, resulting from filing down the back teeth, as I have repeatedly observed in my own animals.

Incidentally, I should like also to mention the very great advantage of thorough mastication in sea-sickness. When other food will not remain in the stomach, one can often retain crackers or dry toast, thoroughly chewed and moistened only by the saliva, and it is a constant direction of mine to sea-going patients that these be so eaten while in bed; the mouth, though dry and parched, will in time moisten this food, and when thus thoroughly chewed the stomach seldom rejects it.

In considering the mouth I have often been struck by the remarkable vitality of its tissues, which I think we hardly realize. Many times a day they may be subjected to repeated irritation from various foreign substances, or to mechanical damage, and yet how seldom are they permanently injured! The powers of healing of the buccal cavity sometimes seem to put all theories of surgical asepsis to naught. Bacteriologists tell us that a dozen or two different microorganisms can always be found in the healthy mouth, and yet, somehow, none of them seems to exert a harmful influence in regard to the repair of injuries, even when pus and presumably its coccus are present. Witness the prompt healing after the extraction of a tooth, or even after the most serious surgical operation, and how rapidly a burn from hot food or drink or from smoking is healed. Surely nature has made

wonderful provision to guard the portal through which the sustenance of the individual must pass.

The explanation for this is found in part in the character of the saliva, as it is proper to designate the combined secretion of the various glands opening into the buccal cavity, including those of the mucous membrane itself, of all of which we know far too little. Like all other animal secretions, the saliva undoubtedly varies materially under different circumstances. We all know well the excessive and watery secretion, induced by pilocarpin and occurring in mercurial salivation, and the diminished secretion caused by atropin. Nervous causes may also at one time produce a free flow of saliva, and at another may almost arrest the secretion and leave the mouth dry and parched, as may also febrile diseases. The effects of food are also well known and the expression "making the mouth water" is often used in regard to certain appetizing articles.

How far or in what manner chronic disordered states of the system affect the saliva is not known with any degree of certainty, but that they do have some effect is beyond doubt; anyone who has had much to do with patients suffering from many minor or gross ailments will testify to the constant mention made of the condition of the mouth. The saliva is often spoken of as thick, viscid, sticky or pasty, and the taste as sweet, sour, bitter or offensive, while the expression "a dark brown taste in the mouth" is very common, in New York at least.

Last year Drs. Stern and Lederer (DENTAL DIGEST, June, 1905, p. 557) presented before this Section the results of some observations and studies on changes in the salivary secretion affected by systemic disease, which, while perhaps not so accurate and complete as could be desired, were certainly a step in the right direction. In diabetes they found the saliva to be acid in about one-third of the cases, and detected glucose in over one-half of them. In uricacidemia it was alkaline in nearly nine-tenths of the specimens, and uric acid was demonstrated in nearly one-third of them. In acute gastritis it was acid in 8 cases and alkaline in 20; in hyperchlorhydria it was acid in nearly 40 per cent of the cases, alkaline in about 22 per cent, and amphoteric in over 35 per cent. and in hypochlorhydria it was acid in 2 cases, alkaline in 15 and

amphoteric in 6. The acidity was found to be due to lactic acid or to acetic acid.

While these studies do not by any means cover the whole ground, or even a small part of it, they are, as just remarked, a step in the right direction, and should serve as a stimulus to others to corroborate or add to them. Unfortunately I cannot contribute any exact data in this direction. I have occasionally tested the secretions from the mouth in patients exhibiting marked acidity of the system, and have found them acid, sometimes neutral, or alkaline, but I have not kept records which can be utilized so I can speak only in a general way, hoping that those who have more time or determination will investigate the matter and give us scientific data to build on.

As already stated, the saliva undoubtedly varies in quantity and quality under different circumstances, and physiologists tell us that the total daily average secretion in health is from two to three pints. The solid ingredients vary according to different analyses, from 3.5 to 11.7 parts per thousand, and the salts from 1.03 to 2.2 parts per thousand. It is interesting to note that while an analysis of the ash from saliva showed nearly 50 per cent to be potash and nearly 10 per cent soda, with a number of other ingredients, but no calcium, an analysis of the so-called tartar on the teeth showed that "the chief part of the inorganic constituents consists of calcium carbonate and phosphate," with some 20 per cent of organic matter.

All of us realize that changes take place in the mouth at different times, but so far as I know no clear or definite knowledge exists as to the conditions causing them. Time and again decay in the teeth starts up suddenly, or they are found unusually soft or eroded, or tartar collects very rapidly, or a pyorrhea alveolaris occurs, etc., and no adequate cause can be determined with certainty. It is easy to ascribe these and other conditions to the action of microorganisms, which undoubtedly have their share in the work, but we must remember that the buccal cavity is constantly full of innumerable varieties of these and more modern sciences, in various directions, teach that microbes cannot develop and become operative except in a suitable soil.

We must therefore look to the constitutional condition of the

individual, as modifying the saliva or soil in which the micro-organisms are bathed, and which in perfect health seems to possess such a marvelous power of protecting all within the buccal cavity from the inroads of bacterial life; even as the phagocytes in the blood guard the general system. It is a common observation that debility or exhaustion of any kind often leaves its imprint on the structures within the mouth, as elsewhere, and the less vital resistance there is in the tissues the more readily do they yield to microbic invasion.

Dyspepsia is undoubtedly a fertile source of trouble in the mouth, as is constantly observed in the case of so-called "canker sores," and decay of the teeth may be found to vary with the condition of the stomach. In the studies referred to by Stern and Lederer, in acidity of the stomach the saliva was found to be acid in nearly 40 per cent of the cases.

The acid condition of the system associated with gout, rheumatism, and rheumatoid arthritis also has an effect on the teeth and gums, as I have witnessed time and again in many cases of pyorrhea alveolaris, some of which I have watched for considerable periods of time. The disease has varied greatly at different times, according to the acidity of the system, often as indicated by the urine, and in many cases I have seen the greatest benefit result to the teeth and sockets from a purely antacid treatment. We all recognize the value of alkalies locally in the mouth, and the injury from acids.

In the light of what has been said, should not the dentist, who is primarily responsible for the mouth, seek the aid of the physician in connection with many of the conditions about which he is consulted? Even as the physician recognizes the need of special skill in dental matters and advises patients to seek it. The subject of diseases of the mouth is a very broad one and can hardly be touched on now, but it is such an important matter, and dentists so often have the opportunity of seeing these affections early, when much can be done by proper treatment, that a few words may be of service.

Syphilis is of course the most frequent cause of lesions within the buccal cavity, for few patients with this disease escape at one time or another some affection of the mucous membranes occa-

sioned thereby. For many reasons it is therefore very important that dentists should appreciate and be able to recognize the effects of the disease in this location. This of itself is a very large subject, on which I have twice addressed the dental profession, and which cannot be fully considered now. I must earnestly utter the warning, however, that dentists should be extremely cautious whenever there are sores, even though they be very superficial, on the lips, tongue, or buccal mucous membrane, and that if not quite certain as to their character, they should seek competent advice before exposing themselves or other patients to the dangers of syphilitic inoculation. As I showed in the first paper alluded to, there are many instances on record where this has occurred, and of course multitudes which have never been reported in the journals.

Aside from canker sores from disordered digestion, leukoplakia is probably the next most frequent condition of disease found in the mouth, chiefly in men, and principally in those who use tobacco. This is commonly a harmless affair, though it may be the starting of an epithelioma, especially if it has been injudiciously treated. It will sometimes give trouble by mildly unpleasant sensations, and often perplexes the physician from its resemblance to some of the lesions of syphilis. Many a patient has long been under antisyphilitic treatment uselessly because of the persistence of this relatively innocent local affection, which has no connection whatever with syphilis.

Epithelioma is the most important disease of the region of the mouth and elsewhere, and it is in connection with this often lamentable affection that dentists can frequently be of the most efficient service in many ways.

In a considerable number of cases of epithelioma of the tongue, and sometimes in that of the inside of the cheeks, the disease has started and is often kept up by irritation from sharp, rough and decayed teeth, and from amalgam fillings, and these should all be sedulously looked to and corrected. Also when there is any process suspected to be epitheliomatous the patient should be urged to seek competent medical advice, for while this disease begins as a purely local process, by neglect or by continued irritation it becomes deep-seated, the glands become infected, and often it is well-

nigh incurable. Happily, the former custom of touching all such sores with nitrate of silver or some other caustic is no longer largely practiced, but I must again raise my voice earnestly against all such meddlesome methods, for in times past I have seen many epitheliomata which had been thus goaded on until their condition was very serious.

Lupus also sometimes affects the gums and palate, but this disease is so very rare in this country that it is hardly to be considered. It commonly exists elsewhere, especially on the face, before attacking internal tissues.

Localized tuberculosis is not infrequent in or about the mouth, and it is not infrequently mistaken for a syphilitic manifestation. Patients should be warned against neglecting this.

There is one more aspect of the medical relations of certain conditions of the mouth which I should like to mention before closing, and that is the effect on the general system, or on special portions of it, in a reflex manner or otherwise, from error or disease in the teeth or jaws. We all recognize the harm done to digestion by bad or imperfect teeth, and we have seen the great benefit to the general health resulting from a proper repair and adjustment of the organs of mastication, so that this process can be perfectly performed. Numberless instances are on record, and we all have seen cases, where some error in the teeth and jaws has caused reflex disorders, headache, neuralgia, etc., which have ceased when the trouble has been rectified. Hence the physician has frequent need of the dentist, and should ever bear in mind the assistance which can be obtained in this direction in obstinate cases.

Finally, purulent discharges in the mouth, as from abscesses or pyorrhea alveolaris, etc., passing into the stomach have a more or less disturbing influence on digestion and nutrition, and should be corrected for this reason if for no other. The same is undoubtedly true in regard to the results of decomposition of food lodged between the teeth, and from mouths not perfectly cleansed one or more times daily. We all know the dreadful condition into which the mouth sometimes gets in acute or febrile diseases, with sordes on the teeth, and it is a question if some of the unpleasant general symptoms occurring in these cases are not caused by the gastric or intestinal fermentation thus set up. It seems certain that some

of the discomfort to the patient, and possibly even some serious complications, could be avoided if more attention were paid to antisepsis in the mouth at these times, when it is notoriously neglected.

DISCUSSION. *Dr. Vida A. Latham,* Chicago, said that her experience in the last few years has been that the conditions of the mouth and teeth are based almost entirely on systemic conditions. One of the great objects of the work in this Section is to try to show a relationship between the system and the teeth and adjoining structures. To her mind syphilis has much to do with the condition of the mouth. She said that she has seen cases in her practice in which syphilis had been contracted, and in which the teeth before infection had been in splendid condition, and afterward discoloration, decay, erosion and abrasion have been marked, with interstitial gingivitis resulting in pyorrhea alveolaris and wasting of the alveolar processes. Dr. Latham said that saliva is a physiologic secretion, and it will remain for a specialist to work out the relationship between pathologic conditions of the saliva and constitutional diseases. In the last two years she has had two cases of gonorrheal infection of the mouth—the only ones she has ever seen. They were demonstrated by microscopic examination, and it was proved conclusively that they were due to infection from the fingers—uncleanliness—rather than from systemic cause. These cases were unusually peculiar; there was marked inflammation with much pain, the teeth became loose, there was a greenish, slimy condition of the gums, and there was slight fever.

Dr. M. I. Schamberg, Philadelphia, said that during the past year he had seen just such cases as Dr. Bulkley had mentioned. He saw one case of lupus, several of carcinoma in the mouth, and in one case the main interest lay in the early diagnosis. The dentist who referred the case to him did so because he was rather doubtful as to the condition. Microscopic examination of the growth, which was very slight at the time, showed it to be an epithelioma. It was treated by the X-ray and an absolute cure took place. Several cases of syphilis of the mouth in various stages have come under Dr. Schamberg's care during the past year. The last was an initial lesion immediately posterior to the superior central incisors. The case had gone on with a wrong diagnosis for three weeks, both the physician and the dentist failing to dis-

cover the cause of the lesion, and the condition was pretty bad. Dr. Schamberg questioned the patient as to possible inoculation, and also as to whether there was any eruption on his body; until he examined the body himself no thought of secondary eruption had been suggested, but he found a very pale, macular syphilid on the abdomen, which decided the case. The mouth lesion had been masked by the application of caustics and other forms of treatment. Such cases show the necessity for thorough insight into medicine generally, and also that the general practitioner is too frequently derelict so far as studies of the mouth are concerned.

Dr. G. V. I. Brown, Milwaukee, said that the value of the dentist's work lies in being able to diagnose cases early. He referred to Dr. Bulkley's statement that the most frequent cause of lesions within the mouth is syphilis, and said that it is a difficult matter for those who deal with the lesions, and do not in any sense treat syphilis except when forced to do so, to decide whether or not the lesion is syphilitic. He is inclined to believe that syphilis as an etiologic factor per se is greatly overestimated, and in some papers too much emphasis has been laid on it. There are many cases in which a diagnosis of syphilis has not been made, and in which the one thing the patient needs is the proper treatment for syphilis, without which of course other measures would not only be useless, but would probably result in serious injury to the patient. On the other hand, Dr. Brown said that frequently time is wasted in endeavoring to overcome systemic conditions which do not exist, when simple, direct, prompt, surgical treatment is required.

Dr. M. L. Rhein, New York, stated that he had occasion last year to take exception to the name of saliva as applied as being misleading. There are in the mouth the submaxillary, the sublingual, and the parotid glands. It is true they are the salivary glands of the mouth, and that they give forth a large percentage of the fluid that circulates in the mouth, but added to these there are all the eliminative secretions of the mucous follicles, which add materially to this fluid. Up to the present this portion of the fluid has had no recognition given to it as having any of the function that pertains to salivary glands, and it is for this reason that exception should be taken to the use of that term. He said that he knew a great many workers take exception to this

criticism, and prefer to employ the word saliva as it has been used in the past. Dr. Rhein agreed with Dr. Bulkley in his explanation of some of the lesions of the mouth, and said the great trouble is that the majority of physicians have no knowledge regarding the normal physiologic condition of the mouth, and consequently when they examine an abnormal mouth they are at sea in regard to making a proper diagnosis either of what may be wrong, or as to whether it is even abnormal as distinguished from physiologic. He said that he has had most startling experiences of this kind, and finds that the medical text-books on this subject are almost of no value. In most instances the conceit of the average medical teacher carries him past this important specialty. To illustrate the average medical man's idea of the mouth, Dr. Rhein told of a patient who presented himself last fall with lesions in his mouth that Dr. Rhein had no hesitancy in diagnosing as marked leukoplakia, and of such a nature that he thought there was strong suspicion of syphilitic etiology. He found that the physician under whose care the patient had been for a number of years had overlooked important facts; he seemed to have paid no attention to the patient's history of losing his hair about five years previously and to other symptoms. On the physician being requested to look into the mouth symptoms, he informed Dr. Rhein by telephone that it was simply an inflammatory condition and that in a few weeks the patient would be perfectly well. Six weeks later the patient had not only not been cured, but the symptoms had increased in severity; there was an active pathologic condition present that was so apparent that Dr. Rhein refused to have any further connection with the case unless some attention was promptly given to the general condition, and when he again called the physician's attention to the patient he finally took him to another practitioner, who at once confirmed the diagnosis of leukoplakia of syphilitic origin. The patient was placed on antisyphilitic treatment and the symptoms were decidedly ameliorated. Dr. Rhein believes that a large proportion of cases have a decided cause of this nature. The trained stomatologist has opportunities for the minute and careful observation of what he sees in the mouth that so educates his sense of perception between the various conditions that it places him in a peculiarly fortunate position as

regards diagnoses. He believes there is no gainsaying the fact that what has made the value of the dental services to the public at large in this country of inestimable value, as compared with what they have received in other parts of the world, is the absolute thoroughness of the work. Dr. Rhein said that there is no reason why the highest scientific utilization of research work of all that we can gain in medicine should not be put to advantage in what is apt to be described at times, and that is the handiwork of the dentist, and he protested against taking one iota of credit from the value of that handicraft.

Dr. Bulkley, referring to stomatology versus dentistry, said that physicians do not have to do with the teeth entirely, but with a thousand other things as well. Stomatology is of very great advantage, and if that can be introduced everywhere it will be a step in advance. He agreed with Dr. Brown that one thing must not be praised to the disparagement of another. American dentistry is recognized all over the world. There are many cases of pyorrhea alveolaris which it would unquestionably be folly to send to a physician. In those which have been under his care he has used peroxid of hydrogen freely. Undoubtedly the first item is proper surgical treatment and perfect dental cleanliness. On the other hand, he asked why a patient has this condition; it is not from the parasites in the mouth. In reference to the saliva, he said that nine-tenths of it is made from the three groups of glands, but the mucus must of course be counted. He did not agree with Dr. Rhein as to using the word "eliminative." There is no reason to believe that these glands of the mouth have any eliminative function; it is simply a moistening process. He called attention to the fact that some of the best dentists are studying and have studied medicine since they began practicing, and are now graduates in medicine. All branches of medicine should be coordinate.

Dr. Bulkley said he still holds that almost everybody who has had syphilis at some time or other has had mucous patches; he has had some patients who have been infected from dirty instruments. He has seen chancre in almost every part of the mouth and tongue. He also stated that he has seen many cases of wasting of alveoli. In times gone by it was supposed that mercury did this, and it created a great furore against it. He asked how many

physicians have reason to believe from their experience that mercury does salivate, as he has not yet found cases in any number in which he thought the mercury was responsible. He has had cases with syphilitic alveolar trouble. The saliva is not an excretion; it is a secretion, and secretions can be altered by disease. He has never happened to come across any cases of gonorrhea of the mouth. He distinguishes between leukoplakia and syphilis. Legally, one does not speak of syphilitic leukoplakia any more than of syphilitic psoriasis. Leukoplakia is one thing and mucous patches of various degrees are another. There is a great deal of leukoplakia sometimes from smoking and from unknown causes, which he is sure is not syphilis. The diagnosis is often very difficult. He concluded by saying that we are just entering on the right aspect of what has been called dentistry.

SILVER NITRATE—A PHARMACO-THERAPEUTIC STUDY

BY HERMANN PRINZ, M.D., D.D.S., ST. LOUIS. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, AT ST. LOUIS, MAY, 1905.

Silver Nitrate (*Argenti Nitras*) $AgNO_3$. *Etymology.*—The Latin term for silver, *argentum*, and the Greek, *argyros*, are derived from the same root, *argos*, meaning *white*, while the Hebrew term "Keseph" is derived from a root meaning pale. The alchemists termed it Luna or Diana, with this symbol: ☽. Geber, the celebrated Arabian alchemist of the eighth century, is the first writer who refers in his works to a formula for making crystalline nitrate of silver; while at the end of the seventeenth century Angelus Sala called the attention of the medical chemists to this salt, which he termed "Crystalli Dianæ" or "Magisterium argenti," from which by melting he obtained the "lapis infernalis."

Synonyms.—Lunar caustic, lapis infernalis, Pierre infernale (French), Höllenstein (German).

Source and Character.—Nitrate of silver is usually prepared by dissolving pure silver in diluted nitric acid, which is set aside for crystallization. "It is a colorless and transparent, tubular, rhombic crystalline salt, becoming gray or grayish-black on exposure to light in the presence of organic matter; odorless, having a bitter,

caustic and strongly metallic taste and a neutral reaction; soluble at 15° C. (59° F.) in 0.6 part of water and 26 parts of alcohol, in 0.1 part of boiling water and 5 parts of boiling alcohol. When heated to about 200° C. (392° F.) the salt melts, forming a faintly yellow liquid, which on cooling congeals to a pure white crystalline mass. At a higher temperature it is gradually decomposed, with the evolution of nitrous vapors."—U. S. P. The solution stains the skin an indelible black color, and is itself discolored by the most minute portions of organic matter, for which it forms a delicate test. The solution also stains linen and muslin fibers; exposure to sunlight hastens the process. To remove the stains, tincture of iodin with a solution of sodium hyposulphite or potassium cyanid or sal ammoniac, may be readily employed. It is incompatible with ordinary water on account of the sodium chlorid which it contains, with soluble chlorids in general, with the mineral acids, with alkalies and their carbonates, with lime-water and with astringent infusions.

Preparations.—Argenti nitras dilutus (U. S. P.), mitigated caustic, prepared by melting together 30 grams of silver nitrate and 60 grams of potassium nitrate and casting into suitable molds. *Argenti nitras fusus* (U. S. P.), lunar caustic, is prepared by melting 100 grams nitrate of silver with 4 grams hydrochloric acid and pouring into suitable molds. The British Pharmacopeia prepares a toughened caustic—*Argenti nitras induratus*—by adding 5 parts of potassium nitrate to 95 parts of silver nitrate.

The dose is ¼ to ½ grain, in pill form or well-diluted solutions.

Medical Properties.—Caustic, astringent, hemostatic and antiphlogistic.

Local and General Action.—When solid silver nitrate is brought into contact with living tissue a deep staining of the superficial layer is produced, which results from the reduction of the silver and which forms a dense film of coagulated albumen, thus limiting its own action. It acts as an escharotic. Acute pain and partial inflammation of the deeper structures occur, finally separating as a slough, with rapid healing of the corroded surface. Upon the mucous membranes or the broken skin it acts much like lead salts, but more powerfully, while it is less active than mercury salts. It readily precipitates the albumens and chlorids of the plasma or

serumal discharge, coagulates protoplasm, and in weak solution actively contracts arteries and veins. The formation of a protective layer of coagulated albumen reduces its action to an astringent. By its controlling influence upon the vascular disturbances, exudations and growth of inflammatory areas, it acts as an antiphlogistic. In solid form it is employed as an excellent hemostatic. Given internally for prolonged periods, or even from prolonged use of silver solution for external application upon mucous surfaces or denuded skin, silver is very often retained in the system, and it permanently stains the body by forming dense granules in the connective tissue, thus giving the skin and mucous membrane an unsightly, black-brown appearance, known as argyria. This pigmentation was more common in earlier years than at present, owing to its restricted use, especially in epileptic disease.

Specific Application in Dentistry.—Before entering into a detailed discussion of the specific action of nitrate of silver upon healthy or diseased dentin, it is probably well to rehearse in a perambulatory way the action of metal salts in general. Metals as such do not induce any serious symptoms in the living organism unless their salts or oxids are formed. Mercury, copper, silver, etc., may pass unaltered through the body without causing poisonous effects. The action of the metal salts in solution does not depend upon the combination of the molecules as a whole, but upon their dissociation into their ions. It is not the concentration of the solution alone, but also the specific action of the metal salts which influences its power as an active agent, namely, as an antiseptic. Further, if the resulting ions are very complex they are less concentrated and consequently less active. The local action of the metal salts depends largely upon the formation of metallic precipitates when brought in contact with proteids or albumens. Usually these newly-formed metal-albuminates are insoluble in water; some, however, are soluble in an excess of proteid, or will dissolve in solutions of neutral salts (sodium chlorid) or organic acids (tartaric or citric). When a solution of a metal salt is applied to a mucous membrane or the surfaces of a wound the albuminates are at once precipitated and the acid with which the metal is combined is set free. Thus a continuous film is formed over the surface, which acts as a mechanical protective to the parts involved, lessening the penetration of the solution into the deeper structures. The free

acid acts as an irritant, which stimulates the circulation of the part, thereby increasing cell activity and the effusion of exudates. If microorganisms are present, which are largely albuminous in their nature, they are acted upon in the same manner as the superficial cells; they become coagulated and the surrounding medium is changed simultaneously to an unfavorable pabulum for the new growth of bacteria.

The same metals attached to different acids induce different effects, depending upon the free acid—e. g., the milder acetic acid, formed from lead acetate, is more of an astringent than the stronger nitric acid, formed from lead nitrate. This latter acid is highly corrosive and acts as an irritant. The action of the various acids attached to one metal differs widely, so much so that all intermediate stages from a mild astingent effect to a widespread necrosis may be produced. The chlorids and the nitrates form the most corrosive acids; the sulphates are milder, while the iodids and bromids are still less irritating. The mildest acids are those formed from the organic salts. The albuminates of the metals do not irritate unless the poisonous effects of the metals themselves are manifested. The toxic properties of the more important metals may be arranged according to the following scale, starting with the mildest one: Iron, aluminum, lead, copper, zinc, silver, mercury, etc.

The organic metal compounds and the double salts of metals do not precipitate albumen; they do not irritate, and only slowly dissociate and diffuse over the parts.

As early as 1846 we read in the "Zahnarzt" that the application of silver nitrate to the crowns of decayed teeth is very beneficial, as it "practically stops the progress of the carious process." Brooks in 1854 calls the attention of the dental profession, through the *American Journal of Dental Science,* to the value of this chemical in the treatment of erosion, saying that "it does discolor the cavity, but it prevents further progress." A number of prominent practitioners—Clark, Chupein, Shanasy, Tomes, Taft, Salter, Bauer, Miller, Peirce and many others—have greatly lauded the value of silver nitrate as a means of abating the progress of dental caries. Taft, in his classical text-book on "Operative Dentistry," as early as 1859 expressed himself most clearly on the action of this chemical—"The compound formed by the nitrate with the organic con-

stituents of the tooth is insoluble except with a few substances, and therefore protects the subjacent parts, and the precipitation of the reduced oxid on the surface affords some additional protection. The insolubility of the compound mentioned prevents an absorption of the nitrate by the dentin and renders its action necessarily superficial. When the nitrate is neutralized by a union with it of an equivalent of the constituents of the dentin no further chemical action is possible. It is quite evident that no harm can result to the tooth from proper application of this agent, beyond the portion of it immediately acted upon. The nitrate can be absorbed by the dentin, but it stimulates the subjacent dentin to more healthy action."

To Stebbins we owe a detailed report of practical clinical observations in regard to the control of the progress of dental caries by means of nitrate of silver, more so in regard to its application to children's teeth. Peirce also advocated this chemical for such purposes, advising small bits of blotting paper saturated with a 4% solution of $AgNO_3$. In 1896 Bethel published his results regarding the sterilization of root canals with 40% to 75% solutions of $AgNO_3$ by means of cataphoresis. Corbett and others advised it for the destruction of the pulp—a long, tedious and very unsatisfactory process. Within the last two years Bryan of Basel has inaugurated a system of dental prophylaxis, in which he strongly advocates the application of a 40% nitrate of silver solution upon tooth surfaces slightly impregnated with the earlier stages of caries. With intervals of three months this process is to be repeated. He is very enthusiastic about his results, believing that the stimulating effect of the $AgNO_3$ application causes the pulp to react by depositing secondary dentin in the crown chamber. Smith has expressed similar views.

In "the course of human events" many of the pertinent clinical observations of the older writers have escaped recent investigators, and many contradictory theories have been promulgated regarding the action of silver nitrate upon dentin. While Harlan claims that "when solutions of silver nitrate were used it was found not to penetrate the tubules to any extent, and it was classed as self-limiting with other coagulants. The silver nitrate furnishes its own stain, and the degree of penetration was easily defined in sections of the root," James Truman relates from his experiments that "the

action of nitrate of silver in repeated tests was rather a surprise. It has generally been regarded as a superficial coagulant, but in every instance has proved deeply penetrating and coagulating, with rapidity and certainty—very nearly equal to zinc chlorid." The above diametrically opposed versions of the two investigators are due to the fact that their research work was conducted upon teeth out of the mouth and in test tubes. Even taking for granted that physic and chemic conditions could be established relatively equal to those in the mouth, there are other processes concerned in the maintenance of "living tissue" which cannot, at present at least, be supplemented in the laboratory. Conclusions drawn from such experiments are often misleading and of little practical value.

The first systematic investigation of the action of nitrate of silver upon dentin was carried out by Szabó, of Prof. Arkövy's clinic, in Budapest. Szabó approached the question from the correct standpoint of the investigator. He said to himself that the chemic and physic experiments upon dentin carried on in the laboratory will never supplement the actual condition of the body, as there are a number of different processes continuously occurring in the living tissue which cannot be artificially imitated. He selected, therefore, central cavities in the lower first right and left permanent molars, and after excavating and drying the cavity, nitrate of silver was applied in substance and in solutions varying from 10% to 40%. This application was repeated in some cases up to twenty-five times, and in due time the tooth was extracted. Microscopical sections were prepared, after fixing and decalcifying, and the following data observed: The contents of the tubuli are, up to a certain depth, destroyed, and small concrements, stained deep black, in the form of débris, are observed. This débris is coagulated albumen resulting from the action of the silver salt, which through the effects of light assumes a black color. By forming the dense mass of coagulated silver-albumen the further action of the nitrate of silver is prevented. In diseased dentin the penetration of the $AgNO_3$ can usually be traced to the line of demarkation, while in healthy dentin the penetration is very superficial.

Very recently (March, 1905) Miller demonstrated before a post-graduate class in Berlin the action of $AgNO_3$ upon normal and decalcified dentin, and he believes that an explanation of the protecting influence of this chemical can be found solely in the fact

that a coagulation of the contents of the dentinal tubuli occurs. With paraffin similar results may be obtained, but as this process necessitates a prior perfect drying of the tooth it is naturally impossible to apply this principle in the mouth.

My own experimental work with the silver salts upon dentin has been amply confirmed by the reports of Szabó and Miller. The hypothesis of pharmacologic experiments rests upon the fact that investigations must be carried on in the living body and not in test tubes. Just what "life-force" means is of no consequence in regard to the experiment. To use a much-worn aphorism, let it be sufficient to know that "life is the sum total of all the forces which resist death, while death is the cessation of all functions, molecular or somatic."

Within recent years the organic silver salts, such as the lactate of silver, known as *actol;* the citrate of silver, known as *itrol,* further as argyrol, protargol, etc., have been much lauded, but they have given results which cannot be compared with the gratifying ones obtained with the nitrate.

The use of silver nitrate in the mouth requires caution. The caustic pencil may loosen from its holder and fall into the larynx. Such an accident is reported in 1871, causing the death of a child. As stated above, the action of $AgNO_3$ upon soft tissue can almost instantaneously be checked by promptly applying sodium chlorid, thus forming the insoluble silver chlorid. Extemporaneously, nitrate of silver may be prepared by dipping a silver wire into nitric acid and thus applying it to the tissues.

Therapeutics.—As stated above, nitrate of silver enjoys an enviable reputation as a prophylactic in the treatment of dental caries; in fact, it is the only chemical at our command that checks the progress of this disease. Its high reputation is of significant importance in the treatment of children's teeth. The various methods employed differ but little in their application. The tooth should be dried as much as possible, the softened decay removed, the nitrate applied in powder and then moistened with just enough water to form a solution and left in contact for five to ten minutes. The stick form may be employed for the same purpose; or blotting paper, according to Peirce; or still better, asbestos felt, as Kirk suggested, saturated with a concentrated solution, is sealed into the cavity. Holmes carries the powdered nitrate into the cavity

upon softened gutta-percha; while Dubois of Paris prepares a special gutta-percha according to this formula:

℞ Gutta-percha ..... 5 parts.
Zinc oxid.....20 parts
Silver nitrate..... 2 parts

Much benefit results from the early application of silver nitrate upon those peculiar denuded tooth surfaces known as erosion. At present we are not justified in giving a definite exposition of the etiology of erosion; investigations, however, seem to point to a form of alkaline caries. The process is certainly inhibited by the $AgNO_3$ application. The objection is the deep-black color which is produced upon the tooth substance. Hypersensitive dentin resulting from carious defects or senile atrophy of alveolar tissues is much benefited by the silver application. For the cauterization of aphthous growth in the oral cavity, the destruction of hypertrophied gingivæ and similar purposes it is recommendable. As a stimulating astringent and antiseptic, applied in various dilutions, for the treatment of suppurative processes of the antrum and for so-called "dry sockets" it deserves much praise. Cravens of Indianapolis lauds it as the ideal medical application in pyorrhea. Applied in substance as a means of destroying gum tissue overlapping an erupting third lower molar, as recommended in the *Items of Interest*, it requires great caution.

Toxicology.—Fatal results from poisoning with nitrate of silver are rare. As stated above, the true chemic antidote is sodium chlorid, which converts the soluble nitrate into an insoluble and inert chlorid of silver. For internal treatment, lavage of the stomach with salt water and large draughts of milk or soap water are recommended. In typical chronic poisoning (argyria), potassium iodid may be beneficial in aiding the elimination of the silver salt.

WAXABLE VULCANITE.

BY C. S. PARKER, D.D.S., NORFOLK, NEB. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 16-18, 1905.

Not all of us are endowed with inventive genius, nor are many of us blessed with that quality of mind which singles a man out from his fellows and distinguishes him as an original thinker. It

is equally true that the really expert operative or mechanical men are few and that their names are familiar to almost all of us. This, I think, is the reason that so many men shrink from appearing before their fellows in the role of essayists and are reluctant to clinic before their brethren unless they have something new.

If the writer ever had any original ideas, they have been of a very somnolent nature and began their Rip Van Winkle stunt prior to the time he was launched upon the turbulent waves of a dental career. So it is not my intention to startle you with anything new, and should success in arousing anyone from his plate-work lethargy be achieved, it will be a source of great satisfaction to the writer and an added pleasure he will have derived from this meeting.

In calling your attention to vulcanized gutta-percha or waxable vulcanite as a base for dentures, I do so with perfect confidence in its ability to withstand any test you may care to apply to it. There are those so-called conservative members of our profession who will doubtless want the test of time applied, and what shall it be? Shall it be ten, twenty or a hundred years? There are many men who have used this material ten years, and some who claim to have used it forty. It is just a decade since I first became acquainted with it, and that acquaintance has increased until I have formed a very strong attachment for it. If this attachment has led me to overlook its faults, I hope some maturer-minded brother will set me right.

As near as can be learned, vulcanized gutta-percha is a combination of the ordinary vulcanizable rubber and gutta-percha; the exact nature of this combination is the manufacturer's secret. When vulcanized it looks like rubber and acts like rubber—if anything, it is less porous and is lighter in weight and cooler in the mouth. The method of manipulating is about the same as employed for base-plate wax—for instance, in the construction of a full upper denture. We will assume the model is in the articulator or with opposing teeth in position. First make clean a place on the bench, secure a pan of clean boiling water, an alcohol lamp or Bunsen burner, and spatula. Take a sheet of vulcanized gutta-percha, soften by dipping in boiling water and mold over model evenly, as you would wax, remove, trim, soften and mold again until it fits model as desired. Care must be used in this molding

process that pressure is not unduly exercised at any one point, for the obvious reason that the plate will be thinner at that point than at others. Now cleanse the teeth to be used of all wax and arrange on plate, heating neck of tooth and pressing to position. Build out contour by the addition of small pieces of the vulcanized gutta-percha by softening in the water and passing through flame to dry, working with warm spatula.

When teeth are satisfactorily arranged, try in mouth and trim for muscle displacement and contour and to prove bite, make what changes seem desirable and return to model. If plain teeth are used and pink festooned gum is desired, begin with last molar and remove all the teeth; this can easily be done by warming teeth slightly. Lay each down on bench in order, so no confusion will arise in replacing them. Cut a strip of pink rubber or pink vulcanized gutta-percha wide enough to extend from just above pin-marks to rim of plate and long enough to run from last molar on left side to last molar on right side. Warm this by passing through flame and lay on face of plate, beginning at the most distal point of either side, pressing it gently into spaces left by removal of teeth. Care should be used to have this surface smooth and free from spatula or fingernail marks. Now take either central, warm by holding in flame and press into its original position. When in place you will observe a festoon has been formed around neck, which can be made heavy or light in proportion to the pressure exerted in returning tooth to place. Replace each tooth in this manner, smoothing palatine surface with warm spatula. Now remove plate from model, take cement made by dissolving vulcanized gutta-percha in turpentine, and paint model around rim and across heel with solution; when dry, warm plate gently over flame and return to model, press firmly to place and spatulate plate to model to prevent plaster running under and lifting plate off model. Now see that articulation is correct. Remove model from articulator and soak in water to drive off air, and flask. Vulcanize slowly and hold at 315° one hour. Finish gum with stiff brush and pumice only, and the rest of the plate as usual.

You have of course taken note of the many advantages this material has over rubber. In partial cases, and especially where clasps are used, there is a distinct gain in not having to reopen flasks. In cases where gum sections are used no visions of dark

joints or fractured sections will haunt you, and as there is no excess of rubber no splotches of red rubber will show through the pink, while danger of displacing teeth by pressure is entirely eliminated. Being lighter than rubber, it is more preferable for full upper dentures. Any thickness of plate can readily be obtained, and for repair cases it is the material par excellence.

DISCUSSION.—*Dr. Wait:* I have used this material in a great many cases and have had very good success with it, but in one or two instances had failures. It has seemed to me that the method of placing the rubber makes it quite a little task to get the teeth back where they originally were. For repair work it is very nice, but it does not have the strength that rubber well vulcanized has. In replacing a tooth and such things as that it comes in very handy, as the work can be quickly done and with a great saving of time; also in repairing a broken plate, but in partial plates it has not the necessary strength.

MECHANICAL SIDE OF DENTISTRY.

BY D. P. SIMS, D.D.S., LINCOLN, NEB. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 16-18, 1905.

Can any good thing come out of Nazareth? Can the finished product be superior to its author or maker? In other words, can the finished work of the dentist be an evidence of his ability?

To be contented is to stand still, to progress is to advance, and we can advance only by striving to reach a high ideal. To raise the status of dentistry we must advance the mental and physical attributes of the men who are in and who are preparing to enter this field of work. We need more learning, culture and ability, and a large store of the first two should be acquired before the student is admitted to the dental college; how much might be difficult to say, as all through life we are supposed to continue to add to our store of these two important qualities.

Ability is not less important, but before we say more on this subject let us find out where we are at, and who we are, and to what class of the world's workers we belong, that we may ascertain toward what our efforts should be directed for our betterment. We have our literary men, authors and editors, but while we

have some among us, we do not claim to belong to that class. Then there are the bankers, great financiers and stock gamblers, but while we have some among us, we cannot live in that class. We have our politicians, those who have to do with the government of the country, statesmen pure and simple-minded, dominated by high and lofty principles only after the money question has been settled, but we do not belong to that class, though they are in our midst.

Perhaps we belong to one of the professions, but which one, for we now have all kinds—those professing to accurate knowledge of everything from the top of our heads to the end of our toe-nails? We have professors LL.D., M.A., Ph.D., F.R.S., etc., etc.

The word profession embraces a great deal; so does the word "dentist." We can, I think, safely and without contradiction claim to belong to a profession. Is it the medical profession to which we belong? A great many try to think so, but I am not sure that we want it that way. Perhaps we have something better, more accurate and scientific.

A doctor is a teacher, and we have doctors D.D., who profess to teach us how to live in the next world, and doctors M.D., who profess to teach us how to live in this world. Some are high up and lofty in their aspirations and devote their time to the mysterious workings of the brain, while others think they get right down to the bottom of things better by choosing something more material as the field best suited to their abilities. I do not know of any one class of men deserving of more credit for their efforts than the medical profession, for they have chosen that which is most difficult—to cure the ills of the human body, when of the whole list of drugs of the Pharmacopeia there are but two specifics. At least so says Osler, who, if he has not been chloroformed, is still one of their great authorities.

What do we want to be the behind end of the medical experiment wagon for, anyway? I do not like to be an appendix which, whenever trouble arises, can be cut off and in this way squelched. The dental profession, under the name of the Section of Stomatology, attempted to break into the American Medical Association, and that is about as far as they have ever gotten. Let us stop being a side attraction and be the whole show; then we can do as we please. I do not like to be patronized, and to be patronized by

an older profession belittles us. By the mere fact that we have accepted this position we stand convicted of inferiority in the eyes of the public on our own testimony.

When you went down to St. Louis last summer what was it you saw at the great Exposition? It was great buildings, beautiful works of architecture, magnificent scenic effects, mechanics of all classes, great engineering projects, and as you contemplated them you were amazed to see what brain had done, what energy and courage had brought about with the assistance of those who work with their hands and fingers. All was mechanics and art; that whole show, excepting some side attractions, was mechanical.

Here I assert that we are mechanics, and we need not be ashamed of it. We are a mechanical profession. It makes it easier to put "profession" to it, doesn't it? If the dental profession years ago had given more attention to the mechanical end of it and less to the theoretical, we would now be better dentists. Our work is almost wholly mechanical and artistic; we are high-grade mechanicians, or should be if our training has been properly directed. Manual training should be given greater importance; carving and molding, or anything which will train the eyes and fingers, is what we need.

To keep doing over and over the same thing, with the mind concentrated on the one idea of arriving at perfection, ends in skill and ability. What great things can be accomplished when the mind is concentrated on the one object of doing perfectly! And it pays; it pays to give every man full value for his money.

I believe there is some sort of an unwritten law, that in the end we get what we deserve. This is not true in every instance, but there is a general average. Like the first law of motion: "A body at rest remains at rest; a body in motion will continue moving with uniform motion in a straight line, unless acted upon by some external force." And likewise we will get what we deserve unless some external force gets in its work first, but it is best not to figure on getting it, for the external force may fool us.

There is no royal road to learning, and there is no straight and broad path, with no chance to go wrong, on which the dentist can glide along on flowery beds of ease, to the music of love, peace, success and reward. He must work if he gets there, and these numerous preparations on the market which are offered to the

dentist to make his work easy will, I fear, be as the music of the sirens which lured Odysseus. If you have the most difficult end of a tooth, the root end, to fill, fill it mechanically with any inert material. This is a case in which it does no good to trust to Faith, Hope and Charity; offerings of perfumed atmosphere will not be sufficient, neither will a lot of stinks to outstink any other lot of stinks which may be in that root.

There need be no guesswork in anything we do; ours is an exact science, or should be. At the present time there is much dental work being done which is far from mechanical perfection. I mean that it is entirely too far from perfect work. A gold crown that is one-sixteenth of an inch larger than the root over which it is placed is an awful job. No machinist worthy the name in a machine-shop would think of making such a fit. A good mechanic in a shop will work to a fraction of a thousandth of an inch. Many of our instruments and apparatus are made up with such care that if in making certain parts a mistake of a thousandth or even one-half a thousandth of an inch is made, they are thrown in the scrap-pile. When work is done to a fraction of a thousandth of an inch, it is accurate mechanical work and something to be proud of.

Before we can make our crowns with that degree of accuracy, we will have to have some better instruments for trimming and taking the measure and shape of the tooth than we have at present; but to miss it a sixteenth or even a thirty-second of an inch is something to be ashamed of. It is not crownwork alone, but almost everything we do is mechanical and requires mechanical ability—the extraction of teeth, the preparation of cavities, the manipulation of filling materials, the polishing of fillings, all prosthetic work, and lastly, the care of all the instruments we use.

As it would make this paper too long to go on with each of the above and attempt to show how the laws of physics apply to each, I will mention only a couple of the most important. A knowledge of the laws relating to levers as applied in the construction of artificial dentures is most useful, and if it is borne in mind that it is best to keep the load between the power and the fulcrum, much will be done in the way of preventing tipping of the plate.

Another point to remember is that in perfectly elastic bodies the angle of incidence is equal to the angle of reflection. This applies to the shaping of all cavities, and especially so if they are

to be filled with porcelain inlays. A study of the directions in which the lines of force will be applied, and the shaping of the cavity so that these forces will be met with a solid wall, at right angles to the lines of each force, should be kept in mind and followed out. In such a construction all force applied tends to press the filling or inlay into the cavity, while if the lines of force act against an inclined plane the tendency is to force the filling out.

As nearly all our work is done with instruments, a knowledge of them is very important. But very few drugs are necessary in the practice of dentistry, and few things are done with drugs that could not be better accomplished with instruments; from the treating of teeth and the destruction of abscesses, all through our various operations, everything can be done with instruments, and consequently to know how to handle them is most important. The student should make his first set of hand instruments—the shaping of them, the hardening and drawing the temper, and then the finishing are as useful and instructive as anything he can be put at, and after that he will know how to take care of them.

Oil is a wonderful thing; you all know what a slippery thing an oily tongue is, and how oil on troubled waters calms them. It is just as good a thing on running machines, and much trouble and many dollars would be saved if dentists but knew the true value of oil, both for the tongue and their machines.

Learning and culture enable us to use our ability to advantage, but without the ability success is not likely to be attained. The conceited man has all kinds of confidence in himself, but he is incompetent; he thinks he is what he is not, and therefore cannot command the confidence of others. The man of real worth is he who, when the public come to him for advice and his services, can speak with that assurance which inspires confidence, because back of it is ability.

The conventionalities of society cannot be ignored, and it has been thought best to assume that we are one of the learned professions. We all understand that, but I think we have been posing—we have been a side attraction. To be the real thing and sail under our own colors would be much more likely to inspire the respect of all people whose respect is worth having. Let us stand on our own merits, live or die, sink or swim, survive or perish, without the aid of any other cult, "ism" or profession on earth.

Digests.

TECHNIQUE OF PULP-REMOVAL AND ROOT-TREATMENT ASSOCIATED THEREWITH. By M. L. Rhein, M.D., D.D.S., New York. • Read before the Connecticut State Dental Association, April 18, 1905. The evolution of dental science during the past twenty-five years has wrought many changes in the technique of pulp-removal and its associate operations and treatment. Dental chemistry has rescued this important field from the plane of empiricism and placed it on a level with the other scientific work of our profession. This is the one field of our labor that is not absolutely open to visual inspection, which accounts to a large extent for the reluctance and fear with which the work is generally undertaken.

The majority of the profession have had such a large percentage of failures that one might suppose they would seize with avidity upon all scientific advancements in this field of operative procedure, but unfortunately this is not the case. What meed of success the average man possesses he soon discovers to be due to painstaking and thorough work followed along well-defined paths, and he fears in consequence the slightest departure from his accustomed lines of procedure. As a result of such conditions the major portion of the profession to-day practice methods but little removed from empiricism.

Our studies of minute anatomy and pathology have taught us the necessity of the aseptic removal of all organic tissue contained in the pulp-chamber and the root-canals, and as much as possible from the canaliculi. These openings are then to be hermetically sealed in an aseptic manner so as to prevent the ingress of any micro-organisms. The accomplishment of this result is an absolute necessity in order to insure a successful operation.

In straight single-rooted teeth such results are easily attained, but as we diverge from these to more irregular forms of multi-rooted teeth with their variations in shape and size, not only of the root itself but of the area of the canal in which the pulp tissue is contained, we are beset by greater difficulties. It may be stated at the outset that with the aid which chemistry has furnished us there remain but a very few of the most irregular types of roots

which cannot be thoroughly cleansed of their pulp-contents. There are many scientific ways at the present date by means of which this important labor can be properly accomplished.

In presenting one of these methods for your consideration, I do so with the confidence begotten of thirteen years' successful practice in the entirety of this technique, a portion of it extending over a period of twenty years. It was about 1884 that I ceased using carbolic acid or creasote in any form in root-canal work, because I was opposed to the preserving of organic tissues which at some future date would tend to discolor the tooth-substance even if they did not become the prey of bacterial infection. The simple technique which I present to you has resulted from a gradual evolution based on the principle which I have previously enunciated of the absolute removal of all organic contents.

As in all operations where infection plays a prominent role, it is necessary to use every available aseptic precaution. The hands of the operator should be as clean and as nearly sterile as possible; the operating table should be in the same condition; the hands of the assistant should be the same; all instruments that are used should be previously sterilized and polished. In fact, all the precautions of the surgical operating room should be employed. In this respect it is essential that no work be done upon the tooth until the rubber dam has been applied. This should be an invariable rule in any work involving pulp or canal treatment at any period.

Removal of Living Pulps.—It is essential to separate into two divisions the removal of pulps, those that may be living and those that are dead. The removal of a living pulp is generally accomplished by one of two methods—the application of arsenious acid or anesthetizing the pulp with cocain hydrochlorid. The use of arsenious acid has become so nearly obsolete, recourse being had to it only in such cases where for some reason or other cocainization is an impossibility, that on account of lack of time it will not be considered.

It is not the purpose of this paper to enter into the detail of the different methods of reaching the pulp, and of the technique of pressure anesthesia, except to say that after a pulp has been exposed it is necessary to use due precaution in the use of pressure anesthesia to avoid two things: First, to guard against the danger of forcing microorganisms with the anesthetic through the end of

the root, or sometimes through the approximal sides of the tooth into the soft tissues; second, every precaution should be taken not to force the anesthetic itself so far that it will pass the confines of the end of the root. Under such conditions a much more favorable outlook for the comfort of the patient can be guaranteed for the next few days than where the anesthetic has been carried well up into the periapical region. It is a common error to use pressure against the cocain solution for too long a time. In case a portion of one of the walls is missing, it is replaced artificially by the use of soft stopping, gutta-percha, or unvulcanized rubber, so that the pressure of the rubber can be made directly against the pulp without danger of the fluid finding an outlet in some other direction. Under such conditions an application of pressure lasting only from five to twenty seconds will produce profound anesthesia of the entire contents of the pulp-canals, while the prolongation of pressure brings with it the liability of forcing the medicament through the foramina.

In all cases of pulp-removal the first essential is to outline the amount of opening that is necessary to give direct access to the orifice of each root-canal. This necessitates the free cutting away of every portion of the tooth-substance that may interfere with the accomplishment of this object. This should be done at the outset, as it serves to make the pulp-chamber more accessible and to simplify all following operative procedure. There is no excuse for violating this fundamental principle, and yet here is where many make their first blunder. Failure to freely expose the orifice of each canal makes it a physical impossibility to thoroughly remove its contents. Conserving of a small amount of tooth-structure is of little value if it is to be followed by an alveolar abscess.

In the posterior teeth the free opening of the pulp-chamber with a fissure bur generally results in the removal of most of the contents of the pulp-chamber. If this has been properly done we have exposed to view the orifices of the different canals. A pulp-canal cleanser of the right size is now selected, care being taken to carefully inspect it with a magnifying glass for any possible flaws that may exist where the barbs are cut. There being no question of the absolute sterility of this broach, it is now delicately passed up the side of the canal, and after it has proceeded as far as possible the broach is turned around with the greatest delicacy in order to

twist the fibers of the pulp around the barbs. This twisting movement is persisted in until the broach is supposed to have reached the end of the canal, when with the same regard to delicacy of manipulation it is withdrawn, and should have the pulp wrapped around it.

There is a great variation in the ease and thoroughness with which the pulp in different canals can be removed on the first attempt. Any difficulty of removal is dependent on two conditions, the vitality of the patient and the presence of nodular masses in the pulp tissue. Under such disadvantageous conditions it frequently happens that the pulps in the different canals will have to be removed in sections. Having reached the stage of instrumentation where it seems impossible to bring away any more pulp-tissue, this method of procedure is abandoned, and recourse is had to chemical means for the purpose of disintegrating and destroying whatever organic tissue remains between the pulp-chamber and the end of the root.

Removal of Dead Pulps.—Reverting now to the other class of cases, where the pulps are dead, the procedure so far as opening up the cavity is concerned varies but little from what has been above outlined. The important point to remember in such cases is the danger of forcing infected pulp-debris through the end of the root, consequently it is important to bathe the interior of the pulp-chamber with a 10 per cent solution of formaldehyd before instrumentation is begun. The mechanical removal of the pulp-contents in these cases is dependent upon how long vitality has ceased to exist in the pulp tissue, and into what condition it has degenerated. This may vary from the form where there still remains a tangible mass of pulp to wind around a cleanser, to those cases where the canal is simply filled with a mass of putrescent liquid.

Having emptied the canals of their contents by instrumentation as far as possible, we find ourselves at the same stage where we left off with the removal of living pulp tissue. Whatever chemical means are now used to remove all remaining portions of organic matter, and as much of the fibrils that enter the tubuli as possible, one important point must be kept in mind, namely, that all coagulating media should be avoided until the process of disintegration has been thoroughly completed, otherwise encystment

of portions of the organic matter will surely take place, to be followed in turn by more or less discoloration of the tooth-substance.

There are two chemical compounds that stand preeminent at the present day for the radical accomplishment of this purpose. Both were introduced into this country the same year, and their action is very similar. Sodium dioxid was demonstrated by Dr. E. C. Kirk in 1893, and in the same year at the Columbian Dental Congress Dr. Emil Schreier of Vienna introduced to the profession the alloy of sodium-potassium (kalium-natrium). Sodium dioxid has the advantage when it is decomposed of combining not only with the putrescent masses in the pulp and disintegrating whatever organic products may be present, but at the same time it also sets free ozonized oxygen which oxidizes whatever coloring matter may exist. It requires, however, a great deal more care in its use, and is much more difficult to manipulate than the sodium and potassium mixture. This latter preparation was originally introduced by Dr. Schreier with the sole idea of saponifying the fats and other organic tissues and then leaving what is considered this harmless matter in the canals. This is not the form of technique I desire to call your attention to in advocating, as I do, the use of kalium-natrium.

A barbed bristle is passed through the paraffin into the sodium-potassium, and with a small amount of the latter clinging to the barbs it is now gently passed into the pulp-canal. The water which is present is at once acted upon, forming sodium and potassium hydroxid, liberating the hydrogen, which gas can be seen escaping. The caustic alkalis in their turn act upon the fats, and the result is a sodium and potassium soap, with glycerin as a by-product. These substances are freely soluble and easily washed out of the canals. The latter process, however, should not be undertaken until all portions either of living organic or decomposed putrescent tissue have been saponified. This stage is determined by the fact that the characteristic bubbling of the sodium and potassium when it comes into contact with either living or putrescent matter has stopped, and the chemical compound rests perfectly inert in the root-canals.

This alloy not only decomposes and disorganizes the tissue that exists in the canals, but in the act of doing so it bores its own

passage through the fine and inaccessible canals, such as the buccal of the upper molars and the mesial of lower molars. Its ability in this respect for finding the end of the most tortuous canal is limited only by the skill and patience with which it is used by the operator. When it no longer finds any fibrils in the tubuli to act on it will cease to give forth the peculiar hissing sound.

The next step is to wash out the soapy mass and any pigments that may be contained therein in order to prevent subsequent discoloration of the tooth-structure. For this purpose I use hydrogen dioxid, which takes the place of the ozonized oxygen set free when sodium dioxid is the agent used. Instead, however, of using simply hydrogen dioxid, I have hit upon the expedient of dissolving in it the most reliable germicide at our command, mercury bichlorid. For this purpose I have found the only available hydrogen-dioxid preparation to be that of Marchand, and I keep ready prepared a solution of 1 part of $HgCl_2$ to 500 H_2O_2. The canals are now thoroughly washed out with this solution, using a glass hypodermic syringe with platinum needles. The oxygen that is set free oxidizes all coloring matter that may remain in the tooth-structure, and on the evaporation of the solution a minute amount of the mercuric chlorid residue is left in the dental tubuli, remaining there as a permanent germicide. The canals are now thoroughly dried; a little sterile cotton or paper is placed in the pulp-chamber, the cavity is sealed with gutta-percha and the patient is dismissed.

If on account of lack of time all the organic tissue has not been saponified at the first sitting, the cavity should be dried and sealed with gutta-percha without washing out the canals with the bichlorid solution. This is recommended in order to avoid coagulating any tissue which could later be disintegrated and washed out. Should some sensitive tissue remain in the canals, a dressing of one of the essential oils should be left under the stopping to obtain the benefit of its anodyne effect.

Upon the patient's return at a subsequent sitting the gutta-percha is removed, and if there be any question as to any organic matter remaining at the ends of the root-canals, the sodium and potassium paste is again applied and followed with the wash of $HgCl_2$ and H_2O_2. The canals are then thoroughly dried with heated air, a few wisps of cotton are wound around a Swiss broach, and this is

dipped in the oil of eucalyptus and passed to the ends of the dried canals. The canals are again dried with heated air, which forces this varnish of eucalyptus oil into the tubuli. The broach with its wisp of cotton is now dipped in a solution of base-plate gutta-percha and chloroform, and this in turn is carried to the ends of the respective canals.

From a bath of 10 per cent formaldehyd a cone of gutta-percha of suitable diameter is now taken and placed in one of the canals. A root-canal plugger is then dipped in pure alcohol and passed through the flame of the alcohol lamp, which in igniting the alcohol not only warms the plugger, but thoroughly disinfects it before it enters the root and presses the gutta-percha cone down to the end of the canal. Sufficient gutta-percha having been placed in the respective canals, and the plugger wound with cotton wet in chloroform, it is now used to pack the gutta-percha to the bottom of the canals in one solid homogeneous mass. The object is attained when the patient feels slight pressure at the end of the root, which denotes that the liquid gutta-percha is penetrating the foramen.

A minute amount of gutta-percha, causing the most imperceptible irritation to the soft tissues, cannot be considered in the light of an irritant if the operation has been attended with due consideration to aseptic surroundings. Its well-known compatibility with the soft tissues renders it the most suitable material for this purpose. The end of the root is now hermetically sealed, and in order to provide against any possible infection from without the gutta-percha is covered with a cement of zinc oxychlorid; over this any other operation may be proceeded with.

The above simple technic is presented to your consideration as being based upon true chemical principles, and has the advantage of a record of many unparalleled successes.

The object of not filling the root at the first sitting is to determine positively whether all particles of organic tissue have been removed. Where the pulp is alive it is impossible to be sure of this at the primary operation, because the contractile property of the cocain preparation is so great that it frequently only temporarily effaces some minute portion of living matter. On the other hand, in putrescent pulps it is frequently impossible to determine at the first sitting how far infection has proceeded.

We now come to another phase of our subject, and that is where the germs of infection have passed through the foramina into the periapical region. These are the cases which commonly give trouble to the most careful operator. This infected zone unfortunately exists owing to the fact that there has been no disturbance of the parts until the canals are cleaned. It matters little with what care the cleansing of the pulp-chamber and the canals may be attended to, should infection exist in the periapical region which has not been diagnosed by the operator the sealing up of the tooth will soon be followed by the characteristic soreness and tenderness which precede an alveolar abscess. It is on this account that the patient should be cautioned to return at the first suspicion of tenderness in the region operated upon. Having determined that this zone of tissue on the outer periphery of the end of the root has become infected, even though no abscess has ever taken place, our attention is now directed to the destruction of the microorganisms that exist in this locality, as well as the cauterization of the diseased territory.

Electrolytic Destruction of Microorganisms.—In 1897 I first published in *Items of Interest* a method for accomplishing this purpose which I have found invaluable. Cataphoresis for anesthetizing dentin was then one of the constant themes of dental discussion. Employing a cataphoric rheostat, I made use of it for the purpose of electrolytically destroying these germs. The method of procedure is as follows: The cathode sponge being placed under the rubber-dam holder against the cheek, an anode of chemically pure zinc is passed to the end of the root-canal, which has been kept wet with the hydrogen dioxid solution. The current of electricity is now turned on, and the voltage gradually raised until from one to five milliamperes of current are passing through the end of the root as denoted by the milliammeter. This current is left turned on from three to seven minutes according to the exigencies of each case.

The action of the electricity upon the chemically pure zinc not only forces the galvanic current through the end of the root into the infected area, but there is carried with it the zinc oxychlorid which is formed by the decomposition of the zinc. This active germicide itself not only electrolytically destroys all microorganisms, but cauterizes the pathogenic area. So positive is this

treatment in my hands that it is immediately followed by the sealing of the end of the root in the manner above described, and while there may be some slight subsequent irritation due to nature's absorption of the coagulated tissues, this is soon followed by the complete cure of the diseased area.

This technic was brought out a couple of years ago in Europe by Miller, and during the last International Dental Congress a paper on the same subject was presented by his assistant, Dr. Kurt Hoffendahl of Berlin. The difference between the method suggested by them and the one presented by me in 1897 consists in their using the platinum point instead of the chemically pure zinc point which I advocate. While there is no question of the destruction of the germs by the simple treatment of the galvanic current, still the coagulation of the infected and frequently necrosed tissue by means of the zinc oxychlorid is of the greatest advantage. This method of sterilization is also recommended to those operators who find it impossible to penetrate to the ends of the very fine canals, as the surest means of leaving the contents of those canals in an absolutely sterile condition.—*Cosmos.*

EXTENSIVE NECROSIS OF THE MANDIBLE CAUSED BY PENETRATING CARIES OF A DECIDUOUS MOLAR. By Prof. Broca (*Archives de Stomat*). Caries of the teeth may constitute at any period of life the cause of severe deep-seated infections. The mandible becomes the seat of carious complications with far greater frequency than the maxillæ. The case described by the author is that of a little girl aged four, presenting a slight swelling of the extreme left of the body of the mandible in the immediate vicinity of the mandibular angle. An examination of the external soft tissues pointed to osteitis, there being, however, no symptoms indicative of abscess formation. The intrabuccal examination showed the absence of the lower left first and second deciduous molars, their former positions being outlined by two round, red swellings. There was also some trismus, due no doubt to irritation of the masseter muscle by the existing osteitis in the region of its attachment.

About eighteen months prior to the examination of the case by Broca the child suffered from severe toothache, which had necessitated the extraction of the two molars. This radical measure,

however, did not result in abatement of all the symptoms present, such as reflex pain in the ear, difficulty in carrying out the movements of the mandible and intermittent swelling of the tissues around the angle of the mandible superinduced by climatic changes. A careful study of all these symptoms and the circumstances under which they made their appearance led Broca to the conclusive diagnosis of mandibular necrosis, which was fully confirmed by the surgical operation performed by him shortly afterward.

In this connection the author calls attention to a very important point bearing directly on the surgical treatment of necrosis, particularly of the mandible, namely, that operative intervention should be postponed until the sequestrum is fully formed and the line of demarkation between the live and dead tissue fully discernible. If the operation is performed too soon it may be eventually necessary to operate anew to remove the further ravages of the disease; otherwise in the primary operation too much sound tissue may be removed in the effort to prevent the possibility of recurrence. Of course in the case of mandibular necrosis the only sign indicating the formation of the sequestrum is the mobility of the disorganized region. In this particular instance, however, while no marked mobility could be detected, the diagnosis was made easy by the presence of other symptoms and by the fact that in young individuals denuded areas of bone very soon become definitely separated from the adjacent sound tissue. The operation was successfully carried out, and a sequestrum was removed from within the body of the mandible and extending from the cuspid to the angle of the mandible, and another from the ascending ramus measuring four centimeters in length by one and a half in width.

This report should be made the subject of careful consideration by those entrusted with the care of children's teeth, part of whose duty should consist in instructing parents on the dangerous possibilities of allowing carious deciduous teeth to remain untreated. As pointed out by Broca, the dangers of deep-seated infections from carious teeth are greater in the young, owing to the conformation of the root, the wide apertures of the apical foramina, and the great vascularity of the alveoli and jaws. Apart from the detrimental effect upon the arrangement and soundness of the permanent organs, caries of the deciduous teeth may lead to systemic disturbances of varied degrees of intensity, such as osteomyelitis,

necrosis, cervical adenitis, disturbances of the digestive tract, reflex disturbances of the eye and ear, etc. Reports similar to the one under consideration, if brought to the attention of parents unmindful of the possible consequences of carious teeth, will do more, in the reviewer's opinion, toward their education in dental matters than anything that might be devised for the purpose, as their attention will doubtless be attracted by the description of such cases from actual practice rather than by isolated facts picked out at random from the literature of the subject.

IODIN—ITS ANTIMICROBIC ACTION. By Guy C. Kinnaman, M.D., Chicago. The uniform satisfaction given by the iodin catgut prepared after the method of Claudius, which has been used by Dr. Nicholas Senn in his clinical work, led him to employ a solution of iodin for irrigation in infected wounds and also for hand sterilization. The results obtained demonstrated clinically the marked potency of iodin in solution as an antiseptic, and its continued use for several years has shown it to be far superior to any antiseptic previously employed.

In order to determine the absolute value of this solution, a series of experiments have been carried out on a number of different microorganisms *in vitro,* and a sufficient number of different organisms and a large quantity of tubes have been used. Therefore one is justified in assuming that the conclusions arrived at from a careful study of the series of experiments represent as nearly as possible the position of iodin in the family of antiseptics. When we try to make an accurate comparison between the members of this numerous family, however, we cannot do so because of the widely different methods of procedure employed by the various investigators, and in addition, the majority of the methods show one or more points of possible error. Not for the purpose of comparison, but with the idea in view of presenting the experimental findings of various men on the more important antiseptic substances, there has been incorporated in this research a a short bibliography of antiseptics in general.

Bichlorid Mercury.—Kyle found that it took 1-1,000 solution bichlorid ten hours to insure no growth of tetanus bacillus. Koch determined that a 1-20,000 solution killed anthrax spores in ten minutes. Klein, however, found that anthrax spores were not

influenced by a 1-100,000 solution acting for one hour. Evans, from experiments on Bacillus anthracis in liquid media, reported that a 1-15,000 for one minute and a 1-20,000 for thirty minutes were effective. In regard to the spores he found that a 1-1,000 for fifteen minutes and a 1-1,500 for one hour were effective. Likewise, a 1-1,000 for five minutes gave growth. On Staphylococcus pyogenes aureus the same author states that a 1-200 solution for fifteen minutes killed, while a 1-250 solution for one hour impaired vitality. Tarnier and Vignal, using the thread method of Koch, found that a 1-1,000 solution for two minutes killed both Streptococcus and Staphylococcus pyogenes aureus. Harrington, employing the same method, states that where the threads are moist an exposure of over fifteen minutes to a 1-1,000 solution is necessary to kill the Bacillus pyocyaneus, while if threads are dry five seconds are sufficient. On Staphylococcus aureus, either on moist or dry threads, from five to ten minutes kill. On Bacillus anthracis, either dry or moist threads, an exposure to a 1-1,000 solution for thirty minutes has no bactericidal effect. Hence he states that bichlorid of mercury is a greatly overrated disinfectant. Burgess, who also used the thread method in his experiments on Bacillus coli communis, found that a 1-750 solution for one minute was effective, as were a 1-2,000 solution for five minutes and a 1-7,500 for ten minutes. Sternberg, from experiments on gonococcus, states that 0.005 per cent bichlorid solution for two hours kills. He concludes that in bichlorid we have a germicidal agent of the highest value.

Carbolic Acid.—Kyle found that the tetanus bacillus had to be exposed to a five per cent carbolic acid solution for six hours in order to assure no growth. Cabbot, on adding five per cent carbolic acid to a putrefactive solution and then transferring several drops of mixture to an aseptic medium, discovered that after five seconds' exposure no putrefaction occurred in fresh tubes. Evans found that on anthrax bacillus a 1-100 solution for five minutes, a 1-150 solution for fifteen minutes, and a 1-175 solution for thirty minutes, were effective. On the spores he got a growth after four hours' exposure to a five per cent solution. A twenty-four hours' exposure, however, was insufficient to insure no growth. A 1-40 solution on Staphylococcus aureus for fifteen minutes gave no growth. Burgess, in his work on Bacillus coli

communis, states that a ten per cent solution kills in one minute, a 2.5 per cent in five minutes, a one per cent in thirty minutes, and a 0.75 per cent in one hour. Blyth found that a ten per cent solution for four hours had no effect on anthrax spores. A twenty-four-hour exposure, however, proved efficient. He used the glass-rod method. On the gonococcus and micrococcus of abscess pus Sternberg found that the action of an 0.8 per cent solution for two hours killed the organisms.

Alcohol.—From experiments on the germicidal effect of alcohol Harrington concludes: "Alcohol of any strength has absolutely no effect on anthrax bacillus; sixty to seventy per cent alcohol is the most efficient strength against non-spore-forming bacteria, i. e., Staphylococcus pyogenes aureus and albus, typhoid bacillus, bacillus of diphtheria, being usually effective in five minutes." Salzwedel and Elsner, using the thread method, state that fifty-five per cent (by weight alcohol) was most destructive to staphylococcus pus, requiring in fresh pus from five to six minutes to be effective. They state that this solution is not quite equal to a 1-1,000 solution of bichlorid, but is as efficient as a three per cent carbolic solution. Sternberg found that with a two-hour exposure a ninety-five per cent alcohol was fatal to gonococci, while a forty per cent solution did the work on the micrococcus of abscess pus.

Hydrogen Peroxid.—In his work on the tetanus bacillus Kyle states that after a forty-eight-hour exposure to hydrogen peroxid the bacillus still grew. On the other hand, Gibier finds, from experiments he has made with a 3.2 per cent hydrogen peroxid solution in water on Bacillus anthracis, Bacillus typhosus, Streptococcus pyogenes, etc., that after some minutes of contact (exact time not stated) the bacteria could not be cultivated from bouillon, hence were destroyed.

Formaldehyd.—Shaw determines that a 1-2,000 solution of formaldehyd broth prevented the growth of Bacillus pyocyaneus. Pottevin finds that five centigrams of formaldehyd to a litre of bouillon stops growth of Bacillus diphtheriæ, pyocyaneus, typhosus and the Staphylococcus pyogenes aureus. Burgess concludes that on Bacillus coli communis a 1-30 solution is destructive in one minute, a 1-50 solution in five minutes, and a 1-150 solution in thirty minutes.

Lysol.—Burgess, who included lysol in his experiments on Bacillus coli, found that a 1-10 aqueous solution killed it in one minute, a 1-30 solution in five minutes, a 1-250 solution in thirty minutes and a 1-300 solution in one hour.

Boric Acid.—Burgess also found that a saturated solution of boric acid was entirely wanting in antiseptic powers, no matter how long the exposure. Sternberg came to a like conclusion from his work on gonococcus and micrococcus of abscess pus.

Phenic Acid.—On streptococci and staphylococci Tarnier and Vignal state that a three per cent aqueous solution of phenic acid is efficient in seventeen minutes, a two per cent solution in eighteen minutes. Chamberland from his experiments finds that anthrax bacilli are killed by a forty-eight-hour exposure to a 1-400 solution of phenic acid.

Salicylic Acid.—A 1-240 solution of salicylic acid for three minutes kills putrefactive organisms, according to Cabbot.

Methyl Violet.—Stillings as his findings from experiments states that methyl violet is three times as strong as bichlorid in its action on anthrax bacillus and quite as effective as it is on Staphylococcus pyogenes aureus.

Nicotin.—Herbert, reviewing the work of Pécholier (1883) on the action of nicotin in alcoholic solution on bacteria, that of Vincent Tassinari de Pise (fumes of tobacco, in 1888), and that of Vissalli (fumes of tobacco, in 1888), and from added experiments of his own (nicotin in alcohol solution), says in conclusion that "nicotin does not appear gifted with very powerful antiseptic properties, for one-third of a drop (sufficient to kill a pigeon in a few seconds) does not prevent the development of certain bacteria in three cubic centimeters of bouillon." But he concludes from experiments of Tassinari on tubercle bacillus and spirillum of Asiatic cholera, and from his own on bacillus diphtheria, that it attenuates the virulence of microbes. Junor reports a case of tetanus cured by local application of infusion of tobacco.

Mercuric Cyanid.—Harrington, using the thread method, found that a 1-1,000 solution of mercuric cyanid had to act in thirty minutes to kill Staphylococcus pyogenes albus, while a three-hour exposure on S. aureus showed no antiseptic effect. Hence it is impractical.

Radium.—It was found by Van Buren, from his experiments on

Bacillus typhosus, Bacillus pyocyaneus and Staphylococcus pyogenes aureus, that radium, acting from eight to thirteen hours, was negative in antiseptic action. Pfeiffer also shows its negative action on Bacillus typhosus and the cholera spirillum.

Collargol.—Fortesque-Brickdale states "in solution of 0.5 per cent and under collargol has no bactericidal effect on Streptococcus pyogenes or Staphylococcus pyogenes aureus after a twenty-four-hour exposure to a one-day-old culture (plate method)." A one per cent solution gave no growth.

Turpentine.—Marx found that it required 1-500 turpentine acting for an hour to hinder the growth of anthrax. Forty minutes were required for Staphylococcus pyogenes aureus.

Glycerin.—Copeman from numerous experiments, fully covered by controls, on Staphylococcus pyogenes aureus and albus, Streptococcus pyogenes, Bacillus anthracis, subtilis coli communis, pyocyaneus, diphtheriæ and tuberculosis, determines: "(1) No visible development of organisms employed takes place in presence of more than thirty per cent glycerin in beef peptone broth; (2) all organisms, except coli and subtilis, are killed in less than one minute in the presence of thirty to forty per cent glycerin in the cold."

Potassium Permanganate.—According to Cabbot, a 1-960 aqueous solution of permanganate potassium requires over six minutes to stop putrefaction in a putrefactive solution. Sternberg found that 0.12 per cent permanganate acting on gonococcus and micrococcus of abscess pus destroyed them.

Bibliography of Antiseptics Containing Iodin in Chemical Combination.—*Biniodid of Mercury.*—On the Staphylococcus aureus and the Streptococcus Tarnier and Vignal have shown that a 1-1,000 solution of biniodid of mercury is destructive in nine minutes; a 1-2,000 solution in twenty-two minutes. On Bacillus coli communis Burgess states that "biniodid of mercury is by far the strongest and best antiseptic (of the ones he tried), and it is not affected by albumin." In his table he places 1-1,000 solution effective in one minute; 1-5,000 in five minutes; 1-20,000 in ten minutes; 1-80,000 in thirty minutes; 1-200,000 in one hour.

Lithio-Mercuric Iodid.—Rosenberger, working with lithio-mercuric iodid (thirty-four per cent mercury, sixty-five per cent iodin, one per cent lithium) and using thread method, found

that on Staphylococcus pyogenes aureus when threads were moist 1-1,000 solution for thirty seconds killed; 1-5,000 for one minute did the same. When threads were dry 1-1,000 for one minute killed; likewise 1-5,000 for three minutes. On Streptococcus pyogenes (dry threads) 1-1,000 for thirty seconds killed; 1-5,000 for thirty seconds killed; threads moist, 1-1,000 for thirty seconds was effective; 1-5,000 required two minutes. On anthrax bacillus 1-1,000 solution was necessary for fifteen minutes when threads were dry, and for thirty minutes when moist threads were used. He concludes that this is a much more powerful germicide than the usual mercuric salts.

Iodoform.—The experimental results differ greatly from the clinical. A great deal of experimental work has been done on iodoform. Its action has been tested on various organisms by numerous investigators, and their findings seem to indicate that it possesses no bactericidal properties of any moment. The men who have so determined are Heyn and Rovsing, Riedlin, Baumgarten, Kronacher, Buchner, Kunz, Schnirer, Lubbert and Tilanus. On the other hand, the work of Mikulicz, who on adding iodoform to putrefying liquids saw putrefaction sometimes stopped and sometimes to continue; that of Maylard, who states that it retards but does not stop the development of anthrax bacillus; and that of Stohegoleff, who found that tubercle bacilli inoculated on five per cent iodoform bouillon were dead in forty-eight hours, seem to indicate that under certain conditions (i. e., where free iodin is eliminated) it has a slight antiseptic value.

Clinically, when the iodoform comes in contact with tissues more free iodin is eliminated, hence the results are much better than experiments would indicate. Its use in tubercular joint injections needs no comment. Vinke reports favorably in two cases of anthrax dressed with iodoform. Sormani found by wounding rabbits and guinea-pigs, injecting them with tetanus bacilli, and then treating them with different antiseptics, that iodoform was the most active of all, and if applied at once tetanus did not appear. Pryor reports thirty-seven cases of puerperal sepsis with but four deaths, treated by packing uterus and widely opened cul-de-sac with iodoform gauze, free iodin being liberated and shown to be present in the urine.

Iodin.—The antiseptic action of iodin was discovered by Da-

vaine in 1873. He found that a 1-12,000 solution caused the virulence of anthrax to disappear in thirty minutes. Tarnier and Vignal, in their work on Staphylococcus pyogenes aureus and Streptococcus pyogenes, found that a 1-1,000 solution of potassium iodid required over an hour to kill, a 1-500 solution required fifteen minutes, and a 1-300 solution required eight minutes. White states that he has made a number of tests and observed that "in strength of 1-1,000 iodin solution in bouillon no growth of streptococcus occurs. Staphylococcus aureus will not grow in strength of 1-5,000." Davaine determines that a 1-170,000 solution of iodin in contact with anthrax blood for fifty to sixty minutes renders it harmless to inject into guinea-pigs. Sternberg states that a 0.2 per cent solution destroys gonococcus acting for two hours. Claudius, in an article describing his method of sterilizing catgut by immersing in a solution of one part iodin, one part potassium iodid and water one hundred parts, for eight days and then transferring to three per cent carbolic acid to rinse off excess of liquid iodin, remarks that from his experiments he has found that a one per cent solution kills Staphylococcus aureus in three minutes and anthrax in twenty hours. He states further that such a long contact is unnecessary (1-5,000 solution kills anthrax spores in a short time).

Clinically iodin solutions have been used with excellent results in treating anthrax. Sereins reported two cases of anthrax cured by injecting a 1-100 solution around and into pustule. Brochin has also reported two cases successfully treated by the same method. Human actinomycosis has been cured by the daily injection of two cubic centimeters of a ten per cent iodin solution, as shown by Gaucher.

In concluding the bibliography, it is only necessary to call attention to the great number of different substances employed as antiseptics to show that as yet the ideal germicide is a negative quantity.

TECHNIC OF EXPERIMENTAL RESEARCH.—*Solution Employed.*—A solution of iodin in sodium iodid and water was prepared after the following formula:

Iodin	2.5 gms.
Sodium iodid	5.5 gms.
Aqua (sterilized)	250.0 cc.

This gave a 1-100 solution, and from this by aqueous dilution strengths of 1-200, 1-300, 1-500 and 1-1,000 were made. In preparing the first solution accuracy was observed in weighing the iodin and sodium iodid, and the same care was followed in making dilutions. The glass containers were sterilized.

Asepticity of Solutions.—The varying strengths of solutions were now tested to see whether or not they were of themselves sterile. For this purpose the plate method was employed. Three drops of solution were used to inoculate a melted agar tube from which a plate was made. From each strength solution three plates were made. After incubating six days every plate was free from colonies, hence sterile. To confirm results inoculations from the different strengths were made on six per cent glycerin potato and incubated six days. The result was again negative in character.

METHOD OF CONDUCTING EXPERIMENTS.—In conducting the several series of experiments an effort was made to employ a method which would offer the minimum possibility of error, and at the same time approach as nearly as possible to the exact relation of bacteria to the body in disease. In other words, the media employed were solid in every case, and the growths on them were allowed to become marked, both in extent and thickness, before beginning experiment. Thus by the thickness of the growth the penetrating power of the liquid could be ascertained.

The microorganisms on which the action of the iodin solutions was tried were various enough to permit of definite deductions being made from the results on the antimicrobic action of iodin. These were: (1) Bacillus prodigiosus; (2) Bacillus anthracis and spores; (3) Bacillus tuberculosis; (4) Staphylococcus pyogenes aureus; (5) Streptococcus pyogenes; (6) Blastomyces dermatitis; (7) Actinomyces bovis. On these various growths in the test-tubes the iodin solutions were deposited by means of a sterilized pipet until the surface of the growth was completely covered. After varying periods of time, which are designated in the tables, small loops of growth thus acted on were transferred to tubes of sterile media and well inoculated, and then put in incubator and watched for growth. No effort was made to wash the inherent iodin solution from the loops because of the danger of washing away the bacteria. For each time of exposure four tubes were used, each one being covered by a control tube. It is well to note that the

bacterial growths transferred were macroscopic and not microscopic in size.

SUMMARY OF EVIDENCE ON ANTHRAX.—Considering first the strength of solution and time of exposure to same necessary to produce the death of Bacillus anthracis plus spores, the evidence shows that a 1-200 solution for one hour or a 1-100 solution for ten minutes brings death. An exposure to a 1-100 solution for less than ten minutes gives a growth. The second consideration or the inhibitory effect, depending as it does on the two factors, i. e., time of exposure and strength of solution, first shows itself after an exposure of the organism to a 1-1,000 solution for sixty minutes. The inhibitory effect is marked. The effect is also shown by an exposure of fifteen minutes to a 1-500 solution, but to a lesser degree. As the time of exposure is increased the inhibitory effect becomes more and more marked. Likewise, as the strength of solution employed is increased the inhibitory action becomes progressively more powerful. If after the death point is reached we decrease the time of exposure we again come into the sphere of diminishing inhibition.

SUMMARY OF EVIDENCE ON PRODIGIOSUS.—In making a summary of the evidence there are two factors to be considered: (1) The strength of solution and time of exposure to same necessary to produce the death of the microorganism; (2) the inhibitory action of solutions. Considering (1) we find that a solution less than one per cent, acting for an hour, does not destroy Bacillus prodigiosus. To cause the death of this organism it is necessary for a 1-100 solution of iodin to act for ten minutes. A shorter period of exposure, i. e., nine, eight and five minutes, gives a growth. On considering (2) it is readily seen that two items have to do with the inhibitory effect—strength of solution and period of exposure. Thus a solution acting for a certain period of time shows no inhibitory effect, but if the time of exposure is increased such an effect appears. Conversely, as the strength of the solution is increased the time of exposure necessary to produce an inhibitory effect becomes less. Bearing these two facts in mind, we find that in this series a slight inhibitory effect is first shown by a 1-1,000 solution after an hour's exposure. A 1-500 solution begins to show this effect after thirty minutes' exposure; a 1-300 solution after fifteen minutes. Thus, progressively, as the time of exposure

to each strength of solution is lengthened, and the strength of the solution itself is increased, the inhibitory action becomes more marked until the death point of the germ is reached, and if we try to decrease the time of exposure necessary to produce death we reach the inhibitory stage again.

SUMMARY OF EVIDENCE ON TUBERCULOSIS.—The evidence shows that to produce the death of the Bacillus tuberculosis an exposure to a 1-200 iodin solution for one hour or to a 1-100 solution for seven minutes is necessary. An exposure of less than seven minutes results in a growth. When we come to the consideration of the inhibitory effect we find that a 1-1,000 solution for one hour is without effect. Inhibition begins to be shown slightly by a 1-500 solution for fifteen minutes. From this point on, as the period of exposure is increased and as the solution employed becomes of greater strength, the inhibitory effect becomes progressively more and more marked until the death point is reached. Then if we try to lessen the time of exposure to the necessary strength we come into the sphere of inhibition which decreases as the exposure decreases.—*Jour. Am. Med. Assn.*

ORAL PATHOLOGY AND ITS RELATION TO GENERAL DISEASE. By T. B. Wiggin, M.D., Chicago. At this time when dental surgery is taking its rightful place as one of the great specialties of medicine, it is profitable to note how dependent the general well-being of the human body is upon the health of the buccal cavity. Even to the most superficial view it is apparent that the day is not far distant when the perfectly equipped dentist must possess a medical degree. On the other hand, the successful diagnostician finds many an obscure case made clear by a profound acquaintance with oral pathology.

In the domain of surgery the knowledge of the causes of oral sepsis has made possible great improvement. This is most clearly shown in the results of such operations as excision of the tongue, removal of the maxillæ, operations in the nose and throat and for cleft palate, in all of which the results are more perfect because hemorrhage and septic infection are uncommon, and secondary infections, as pneumonia, parotitis and erysipelas, are almost unknown. The importance of a preliminary sterilization of the mouth, and of all foods prior to operations on the stomach and bowels, is uni-

versally recognized and the profession are indebted to Harvey Cushing of Baltimore for their knowledge.

Dental bacteriology is still in its infancy, but much good work has been done in this direction by both dentists and physicians, among whom may be mentioned Miller, Vignal, Fluegge, Sanarelli, Netter, Arkovy, Black, Goadby, Levings and a host of others. The knowledge thus obtained is of great benefit to the physician as well as the dentist, for in the mouth are found local lesions of many acute infections as well as constitutional diseases. Among such we may mention smallpox, varicelli, diphtheria, influenza, measles, scarlatina, tuberculosis, diabetes, scurvy and syphilis. In a number of these the specific microorganisms are present—notably in tuberculosis and diphtheria. Many of the diseased conditions found in the mouth and contiguous structures are due to pathogenic microorganisms. Of these we now recognize tuberculosis, thrush, anthrax, actinomycosis, erysipelas, ulcerative and gangrenous stomatitis, pyorrhea alveolaris and dental caries. These organisms unless guarded against may at any time infect wounds made in the course of surgical or dental work, resulting in a general pyemia or septicemia. Indeed, many deaths are on record following the extractions of a tooth, which may be thus explained. Speaking broadly, it is not an exaggeration to state that the source of most suppurative conditions of the face and neck is in the mouth.

Again, food, air and drink taken through the mouth may introduce a variety of disease-producing germs, which find in the warmth, moisture and organic material present a perfect culture media. Levings has found from a study of the bacterial contents of one hundred healthy mouths of various degrees of cleanliness, and eighteen mouths, the seat of some pathologic process, that both pyogenic and pathogenic germs are present in healthy, clean mouths, but their number is greatly increased in filthy mouths and in those the seat of pathogenic processes. Examination of twenty clean mouths showed staphylococci present in almost all; micrococcus tetragenus in fifteen; pneumococcus in eight, sarcinæ in six; streptococcus in two, of the bacilli, all shapes, sizes and varieties. The bacillus coli communis in three cases; the bacillus prodigiosus in one, and in all cases large numbers of acid and gas-producers, as the bacillus acidi lactici, bacillus butyricus, etc. In ordinary kept mouths more bacteria were found than in clean

ones, the putrefactive bacteria being markedly increased, and in two of the group the bacillus of influenza was found. In the filthy mouths examined millions of bacteria were present and a large number virulent. The pneumococcus was found in ten of thirty cases, and in two thrush was present and its organism demonstrated. The number of acid and gas-producing organisms was greatly increased. In the tobacco-chewers' mouth acid and gas-producers, putrefactive bacteria, sarcinæ and fungi were numerous, and the bacillus of influenza, Friedlander's bacillus, staphylococci and streptococci were isolated. This is directly in opposition to the popular idea that tobacco-chewing protects the teeth from decay, and proves that tobacco has no restraining influence on the growth of bacteria. As a result of experiments made to determine the number of bacteria thrown from the mouth in ordinary conversation, forced expiration and coughing, plates exposed at various distances up to twenty feet showed from 235 to 23 colonies. A plate exposed in front of a mouth covered with three thicknesses of gauze developed eight colonies.

This should be sufficient to make it imperative that surgeons, especially in abdominal operations, sterilize their mouths as perfectly as possible prior to operations, cover the nose and mouth with at least four thicknesses of gauze, and avoid all unnecessary conversation. Latham reports having found gonococci in two mouths, and traced the infection to dirty hands. There was marked inflammation, pain, loosening of the teeth and a greenish slimy condition of the gums with slight fever. Purulent discharges in the mouth as from abscesses, pyorrhea alveolaris, etc., passing into the stomach are often the source of a general catarrh of the digestive tube. Gingivitis (Edward Blake) is a gouty sign strictly identical with the similar congestion of the anatomically-like structure, the sublunular fold of the gouty man's finger tip. It develops into pyorrhea alveolaris, or it dwindles and becomes the atrophic or receding gum of the gouty. Dr. D. E. Langenhagen draws attention to the frequency of inflammation of the gums and the buccal mucosa generally in cases of colitis. This shows how nearly related colitis is to sprue. It is of interest to note that in colitis the saliva is acid, as can readily be proved by testing with blue litmus paper. Now acid is one of the two well-known reagents which possess the property of coagulating mucin, and this undoubtedly

explains the viscid character of catarrhal secretions in contradistinction to the glycerin-like secretion of mucous surfaces in a state of health. The saliva is found to be acid in 40 per cent of the cases of acidity of the stomach, and its alkalinity is lost and it becomes neutral or acid in such acid conditions of the system as are associated with gout, rheumatism and rheumatoid arthritis. The majority of such cases show at the beginning a gingivitis with a succeeding pyorrhea alveolaris, which conditions become aggravated by the periodical acidity of the saliva. At such times the greatest benefit results to the teeth and sockets from a purely antacid treatment, and we all recognize the value of alkalies locally in the mouth and the injury from acids.

A general catarrh of the entire length of the food tube, which we may call "tubal catarrh," will most often have its origin in the mouth. It manifests itself as an inflammation of the gums and buccal mucosa, generally classed as a scorbutic condition. The chief predisposing causes in the infant are heredity and malnutrition; the direct cause, neglect of the mouth, permitting food to accumulate about the teeth, thus allowing putrefactive bacteria to dissolve the albuminous substance and the dentin decalcifies. Thrush often develops. The gums and teeth become congested and tender, the food, improperly masticated, is delayed in the stomach, ferments and causes dilation, gastric and intestinal troubles, resulting finally in diarrhea, entero-colitis, dysentery and appendicitis. Acute attacks often follow each other, becoming finally subacute and chronic.

Poorly selected and scanty food consumed by the mother before the birth of the child predisposes to just such conditions. When the child is born pure milk is difficult to get and the many patent foods used instead at that critical period have a lasting effect upon the succeeding dentitions. As the child grows up the error in feeding is accentuated, and the necessity of grinding the food is replaced by machinery and cooking. Primal man used his teeth for grinding purposes, in triturating vegetable substances in order to liberate the starches from their indigestible cellulose envelope. Civilized man has attained the same end by milling and cooking, and we see the result in the gradual disappearance of the last molar.

Every patient should be taught that perfect health is impossible

without perfect mastication, and that perfect mastication is impossible without a good grinding mill. Two molars in good order should be able to come in complete contact with two other molars. There is no proper trituration of vegetable food unless this state of things be present. In other words, it takes at least four molars to make a mill. People should be educated in common cleanliness as to the teeth and as to their proper employment. They are not only not taught in early life to use the teeth vigorously, but everything is done to make their employment unnecessary. Witness the flood of prepared breakfast foods and predigested so-called health foods. It has indeed been shown by one of the most sagacious and philosophic of modern physicians that in ordinary life the jaws are not used properly in chewing the foods, and that the tendency of civilization in providing implements for the subdivision of the foods and in supplying children with food which is practically ready chewed for them is leading slowly to degeneration of the jaw and disappearance of the teeth.

This fact is recognized by dentists, and in a recent paper on this subject M. H. Fletcher concludes "that with the superior intelligence of civilized man, assisted as he is by milling and cooking, the actual necessity of teeth is almost nil. Physiology proves that the chemical action of the saliva is so soon cut off by the hydrochloric acid of the gastric juice that this action might be dispensed with, and that moistening and lubrication can be replaced by various beverages." While this may be allowed, and while we all know many old people entirely without teeth who have lived on a liquid and semi-solid diet for many years, apparently in as good, or it may be better, health than many who have their natural teeth or artificial dentures, we must still believe that man now and for many generations to come will maintain the full vigor of health only by a careful preservation of these organs.

It is very curious that while physicians never omit to examine the tongue carefully, the teeth as a rule are not even noticed. Why do they not bestow at least an equal amount of time to a careful examination of the teeth? These latter tell us a great deal more than the changing tongue. This tells us most of the present, while the teeth are the landmarks of the past. Their number, size, shape, position, substance, color and cleanliness are of infinite importance to the owner. The condition of the gums is eloquent of past

diseases, present health and future possibilities. To mention only a few of these: Scurvy, salivation, saturnism, hereditary syphilis, gout and all the vast family associated with anemia. Markings (G. Lenox Curtis) in the form of opaque spots and corrugations are certain traces of periods of interrupted nutrition that have occurred perhaps years in the past when the enamel was soft and impressionable. Pits in the enamel are commonly ascribed to the occurrence of the eruptive fevers during the period of dentition—the presence of Hutchinson's notches is regarded as absolute proof of hereditary syphilis, though some believe that they may be caused by the use of mercury to salivation. The transverse corrugations point to an antecedent rheumatism, the result of autointoxication. The longitudinal lines result from intestinal indigestion and are especially prominent following colitis, proctitis and hemorrhoids.

Dentists should be very careful when there are sores on the lips, tongue or mucous membrane of the mouth, and if in any doubt as to their character should seek medical advice, lest they expose themselves and patients to the dangers of syphilitic inoculation. I have seen many instances of the primary lesion of this disease on the lips or in the mouth.

Such a common and usually harmless affection as leukoplakia demands that treatment should be instituted, as it may be the beginning of epithelioma and is often mistaken for the lesions of syphilis. Epithelioma is the most dreaded and therefore the most important disease of this region. Many cases of epithelioma of the tongue, lips and cheeks owe their start to the irritation from rough or decayed teeth, or fillings poorly finished, neglected or broken down. When a cancer is suspected, immediate excision with subsequent treatment with X-rays saves many lives.

Localized tuberculosis is frequent in the mouth and is often mistaken for syphilis. Tuberculosis of the tonsil is common, especially in children, and is usually associated with nasal obstruction due to the growth of a low type of cellular tissue with adenoids in the upper pharynx. The consequent defective development of the lungs, and the statistics which show that one-fifth of consumptives are mouth-breathers, and that projecting teeth, together with these conditions, may produce phthisis, are points worthy of remembrance.

Disease of the teeth and jaws produces perhaps its most fre-

quent and plainly recognized effect on the general system in a reflex manner through the nervous system. Thus headache, neuralgia of the trigeminal nerve, and many painful affections of the eye, ear and nose have in my experience been relieved by the care and skill of the dentist. Campbell records three cases of iritis, with no history or syphilis or rheumatism. In all three there was marked evidence of oral sepsis; gums bled easily, pyorrhea alveolaris was present and the breath had a sour smell. The mouth was rendered as aseptic as possible, and under this treatment, with tonics and mydriatics, a quick recovery occurred in all cases.

Finally in acute febrile diseases which are accompanied by sordes on the teeth, the event may often be determined by the care with which the mouth is sterilized. This prevents the gastric and intestinal fermentation, which would otherwise be set up by swallowing the contents of the unclean mouth. In this way nutrition is better maintained; the blood being thus replenished, gives to the cells of the whole organism a better supply of nutritive pabulum, and bodily resistance is thus able to more easily overcome the bacteria and toxins of the disease.

All causes that lessen the resistance of the tissues to injuries may be classed as predisposing causes to pyorrhea. Among these we may mention acute and chronic infections, and such constitutional diseases as rickets, chronic dyspepsia, metal intoxications and diabetes mellitus. In a word, errors in metabolism resulting in a more or less severe grade of autointoxication due to the retention of the normal products of oxidation, or the absorption and retention of elements abnormal to the organism. Local disturbances and bacterial infection complete the triad of causes productive of pyorrhea. Up to this time no specific organism has been proven to cause the disease, so that we may assume that it results from a mixed infection. From what has been said of the flora of the mouth it is plain that any slight lessening of resistance of the tissues of this region favors the growth of the pyogenic and pathogenic bacteria present. In diabetes we have an excellent example of the action of any disease in the production of a general lessening of resistance of all the tissues of the body. In this instance the bacteria of the mouth become virulent and active. The acid reaction of the saliva is marked in diabetes—one of the signs of the saturation of the body with acids. This acidity calls forth an

increased neutralization by the alkaline earths of the tissues which are held in solution, according to Naunyer, by the carbonic acid and poured out by the saliva. The CO_2 becomes liberated in the mouth and the precipitated lime salts are deposited upon the teeth. This accounts for the very rapid formation of tartar in diabetics.

The prevention of oral disease, we thus perceive, is the prevention of many systemic and general diseases which often destroy life. Such prophylaxis must begin with the pregnant mother, who should be so cared for that she may form plenty of pure blood, so that the future child may be abundantly nourished. Fresh air, sunshine, exercise, good food and cleanliness must be hers to command. The child when born must be guarded and guided along the same channels, and from the first day the oral cavity must be cleansed after each feeding. When the teeth come they must be preserved by proper cleaning and restored when decay begins, that the contour of the jaw be developed and room for the final dentition be abundant. To sterilize the mouth we must thoroughly scrub the gums with a stiff brush and warm soap water, afterward rinsing with normal salt solution and rubbing with sterile gauze for five minutes. Rinsing the mouth with any mild antiseptic solution has little effect upon the bacteria, as the secretions rapidly neutralize the antiseptic. Scrubbing well with a stiff brush is absolutely essential to any attempt at sterilization. Were such simple and obvious precautions taken with every child they would become a fixed habit throughout life, and we would see a distinct improvement in the condition of the mouth, which would be evident in the longer average life.

People should be taught the importance of prophylaxis. They should all go regularly to a competent dentist at least once in every three months, for the removal of all deposits from the teeth, destruction of pus pockets, extraction or filling of carious teeth, and the correction of all deformities.—*Northwestern.*

ERRORS, MISTAKES, AND FAILURES, OLD AND NEW. By Dr. C. W. Strang, Bridgeport, Conn. Read before The New York Institute of Stomatology, June 6, 1905. While it may be true that too much brooding over one's failures is depressing to mind and body and productive of harm, yet most of us have learned from experience and observation that failures

many times have been blessings in disguise and the stepping-stones to success and renown. The words error, blunder, mistake, and failure, while sometimes used interchangeably, are not synonymous, but in the order named stand somewhat in the relation of sequence, the one leading up to the other.

Recalling my advent as a dental practitioner, without any training along the lines of practical business, the unsuitable light for operative purposes had in the first two offices occupied, the scanty equipment, both at the chair and in the laboratory, my heart goes out in sympathy to any struggling young man who is similarly situated; and the wonder is that failures are not more numerous and success less frequent.

In our early days it was strenuously advocated by some eminent in the profession that if teeth were worth filling at all they were worth filling with gold. I absorbed enough of that sentiment to warrant me in now declaring that the experience gained in the manipulation of gold was purchased at a high rate, in so far as the interests of my patients were concerned. Cohesive gold fillings inserted in the anterior teeth of children twelve or fifteen years of age, no rubber dam, no obtunder, a wooden wedge crowded or driven between the teeth against the gum—the thought of the anguish then inflicted makes us shudder now. It was a mistake, for in a year or two I had the great mortification of seeing much of that work failing at the cervical border, and had it not been for the operations made in the masticating surfaces of the molars, which generally did fairly well, I would have been left without a reputation, or possibly with a bad one.

Prior to the introduction of the rubber dam the large percentage of failures arising from the impracticability of properly treating and filling the root-canals of posterior teeth, particularly the inferior molars, stimulated experiment along the line of conservative pulp-treatment. Of all the agents employed for capping exposed pulps oxychlorid of zinc received the greatest boom. I can recall as though it were but yesterday hearing Dr. Atkinson tell how the operation should be made. It ran something like this: Remove the decay from the cavity, prepare cavity as indicated for filling to be inserted, thoroughly dry out the cavity, sop the exposed pulp with creosote—the creosote unites with the albumin and forms an insoluble compound. That insoluble com-

pound, what hopes we built upon it! Mix the oxychlorid to the consistency of cream, place into the cavity, and gently coax it over the pulp. After it has had time to harden put in the filling. Kiss your patient good-bye and all will be well. I took up pulp-capping and tried faithfully to follow Dr. Atkinson's directions, cutting out the kissing part. Josh Billings said when he heard them sing, "Come where my love lies dreaming," he never went because he did not think it was right.

What were the results? Just what we would now expect where little or no thought is given to pathological conditions. A few thus treated remained comfortable and retained vitality for longer or shorter periods, but many became so painful that relief was sought in extraction or other treatment. In some instances, where actual exposure had been repaired by a deposit of secondary dentin and conditions promised well, congestion set in, and it became necessary to devitalize the pulp and treat accordingly.

It was the failures of long years ago to treat successfully or give much relief in those cases where pyorrhea alveolaris was getting in its work, that gave a stimulus to be thorough in the care of the mouths of our patients, systematically and regularly removing the foreign deposit, believing that under those conditions the dreaded disease would not be as likely to develop. I have been abundantly rewarded for the time and labor expended in this particular kind of work, though it has not been as fascinating as making gold operations, and not as remunerative.

Personal experience with an exposed pulp in each of the inferior first molars in my early teens afforded an opportunity to obtain knowledge concerning that malcondition that certainly could not have been procured in any other way and I also retain pronounced recollections of agonies endured from an occasional accidental impacting of some foreign substance upon a congested pulp. An alveolar abscess at the root of each of these molars for ten or twelve years afforded an opportunity for the acquisition of more valuable information. The possibilities lurking in pulpless teeth made such a profound impression on me that I was stimulated in after years in examinations to be scrupulously careful not to overlook cavities in obscure places, avoiding as much as possible the necessity of devitalizing pulps.

With the introduction of the dental engine and its equipment

many of the instruments employed in cavity preparation prior to that time have gradually become obsolete, and presumably there are few dental operators who have come into the profession during the last score of years whose instrument cabinets contain a good assortment of excavators, chisels, hand burs and plug finishing burs. This I regard as a mistake, and as a result of the mistake more pain is inflicted, and frail walls are unwittingly left to be broken down at a later time, necessitating a repetition of the operation of filling. A few well-directed strokes of the enamel chisel in the hand of the skilled operator will in a moment or two effectually remove that which should be sacrificed, and with the infliction of less pain and discomfort to the patient than that produced by the abrasive wheels and burs revolved rapidly in the handpiece of the engine.

Again, with the advent of the engine the final polishing of the teeth with stick and pumice-stone was very generally abandoned by most operators, and the rubber cups and points substituted for that purpose, and this in the light of present developments I believe has been a mistake, and my convictions are deepened and strengthened by almost daily experience and observation.

A recent case in practice has a bearing upon this point, and although medicaments were also employed in the treatment, the chief factor in bringing about a normal and healthy condition of the mouth was absolute cleanliness of the teeth obtained by frequent and thorough use of the orange-wood points carried in the porte-polishers and loaded with pumice-stone. The case is as follows: In the afternoon of the last Sunday of October a gentleman by direction of his family physician, called and requested me to treat his wife, who was suffering with a badly inflamed mouth. The case, he stated, had been treated from time to time by a dentist for about three months, but as it grew worse rather than better had been transferred to an oral surgeon, who after a few days' treatment by spraying the mouth advised the patient to consult a physician, that she might also receive systemic treatment. Under these circumstances the patient decided to return to her home for treatment.

An examination revealed the following condition: The lips and a space extending for a half-inch from the border of the mouth were a solid mass of ulcers resembling very much the

fever sores that are commonly seen about the mouths of children. Around all the molars, both inferior and superior, the gums were spongy and puffed and rolled over upon the masticating surfaces of some of them, and hemorrhage was induced by slight interference. The tongue, roof of the mouth, and, indeed, the mucous membrane of the mouth everywhere was thickly studded with ulcer patches. Articulation was so interfered with by the excessive inflammation that it was almost impossible to understand the patient in conversation.

The treatment consisted, first, of an application of rose water and glycerin to the lips and surrounding parts, to render them as pliable as possible, then the removal of whatever of hard deposit that was attached to the teeth, and this was not abundant; then about two hours were spent in polishing the teeth with the orange-wood points loaded with pumice-stone moistened with phenol sodique. As each tooth was polished the gum tissue about it was syringed with tepid water. The patient was directed to rinse the mouth every hour with milk of magnesia every other day alternating with precipitated chalk, 2 parts, carbonate of magnesia, 1 part, mixed to the consistency of cream, a tablespoonful to a glass of water. At the end of five days the case was again seen and no perceptible improvement was observed. The polishing and cleansing were repeated and the antacid treatment continued. At the end of another period of five days the case was again seen and the improvement was remarkable. The treatment as described was continued for one month, at intervals of five or six days, when the patient was dismissed with the mouth in a perfectly normal condition.

In conclusion, I desire to tender to Dr. D. D. Smith acknowledgments for courtesies extended to me nearly two years ago at his office. Also to say that through his teachings came a preparation that has enabled me to treat so successfully not only the case just referred to, but others of a serious if not similar nature.

About seven years ago a lady who had been a patient of mine for twenty-five years consulted me with regard to a pain that she had in the left side of the lower jaw, beginning at about the median line and extending back to the ramus of the jaw. This disturbance had gone on for five or six weeks before she came to me. There was over the ramus of the jaw a little swelling.

The second bicuspid and the first molar had been removed a number of years before and she was wearing a partial plate. The second molar had been badly worn away, and I diagnosed the case as probably a dead pulp in this tooth. Upon entering the tooth I found the pulp dead in the anterior but alive in the posterior root. I devitalized the pulp in the posterior root, but to my surprise could not find any opening into the anterior root; it seemed to have closed. After treating the tooth for a while I filled it temporarily, but the pain continued. There was no change, especially in so far as the prominence on the face was concerned. I opened into the soft tissues, but found no pus, only a slight discharge of serum. I said to my clerk, "We have a malignant case here." I wrote up the history of the case and advised the patient to consult a specialist in this city. She did so and he advised certain treatment, stating that he found nothing of malignancy in the case. She went under the care of her family physician, and I saw nothing of her for a week, when the physician came to me saying that there was pus somewhere in that region, and that if I would open into the pus cavity he would stand back of me. I did not care to go on with the case without having something more definite, so I telegraphed the specialist the opinion of the family physician. He advised a free incision, so I met the physician at the home of the patient and made the incision. We found no pus there, but the physician said that there would be pus in three or four days. The wound was packed with iodoform gauze. On the following day the patient's face was badly swollen, but no pus had made its appearance. I insisted upon getting the advice of another specialist in this city, who also said that he saw nothing of malignancy. He believed it was a case of necrosis, and advised immediate operation, so the patient came to this city and was operated upon. The molar was removed and that tooth which was very firm at first, too firm I might say, at the time of the operation had no bone about it, so was removed without using any force whatever. Considerable disorganized bone was removed at that time. The patient remained in New York under treatment, and in about six weeks I received a letter from the surgeon stating that he would again operate, and inviting me to be present, but I could not leave. A specimen was prepared at this time for microscopical examination, and the case was found

to be malignant. The patient returned to her home about the holidays and lived until the following April. Somebody made a mistake in this case.

In June last a young man called upon me at the request of his physician. There was a growth under his tongue extending back as far as the second bicuspid on either side. It had been increasing for about a year and had been very annoying for the last few months. I think if that case had come to me three years before, about the first thing I would have done would have been to put a knife into it. I know now that if I had done this I should have made a mistake. There was much deposit on the lower teeth, so they were thoroughly cleansed. In two weeks there was a marked improvement, and in about a month the mouth had returned to a normal condition.—*International.*

PROPHYLAXIS. By C. L. Hungerford, D.D.S., Kansas City, Mo. Read before the Kansas State Dental Association, at Topeka, May 18-20, 1905. It seems to me that prophylaxis is preventive. Not all the operations that we do in the mouth are preventive; I will therefore not deal with any of these operations, because that is the general tenor of all our papers but rather criticise some of the methods that prevent these operations from being a success. As a rule prophylaxis deals with fermentation, putrefaction and cleanliness. I think it were folly for any man to get up before a body of intelligent dentists and tell them to brush their teeth. It is necessary to get rid of all fermenting or fermentative or putrefactive products. It is necessary to use the tooth-brush this way or that way and cleanse the teeth. We all know that. Some of us cleanse our teeth as best we can; some of us do it a little better than others; some have more intelligence, some have more adaptability, some have greater appreciation of "how" than others, but there are a few general things that might be said of prophylaxis that are very largely and generally overlooked.

I believe that few teeth receive enough exercise. With the modern predigested foods, oatmeal and cereal foods of various kinds, we have entered upon a very vicious régime in this matter of food products that require no mastication, but which permit a soft, pulpy mass of fermentable material to collect around irregularities and in the interstitial spaces, and constitute one of the

large factors in producing dental caries and diseased conditions of the gum. I believe that the higher the civilization the more perfect the teeth. I do not believe that the teeth of the elephant, the chimpanzee, the ape, the Australian Bushman, the African Negro, or the lower types of the Caucasian race, are as good as the teeth of the higher and more civilized members of the human family. This can be rather readily demonstrated if you pause to consider that it is not always a question of education, social advancement or financial standing that makes for the highest type of civilization. I have seen little ragged urchins in the gutter, whose eyes and forehead and features and general physical build and whose quickness and methods in selling their papers indicated that they belonged to the very highest type of the Aryan race, and I have had patients in my office that were multimillionaires, whose place really should have been South, North or Middle Africa. This question of civilization or want of civilization is so greatly misunderstood. We are prone to consider those people most civilized and to have reached the highest attainment who possess the entrée to the most exclusive fashionable circles. That is not civilization.

To go back to my subject a while—as you see, I am in the habit of chewing gum, because I have indigestion, and the extra amount of saliva and ptyalin help to digest the food. For men who have poor teeth and poor roots of teeth it is their duty, if they are compelled to live on these soft, mushy foods, to resort to some method of giving the teeth exercise, and I know of none better than the use of gum. The use of chewing tobacco is also somewhat beneficial in that respect, but as a rule a man who chews tobacco does not masticate it, but carries it as a wad in his cheek. It is well known that in the case of tobacco-chewers some acquire the habit of chewing it on one side of the mouth only, and the teeth on that side will remain in the mouth until old age, whereas on the other side all the teeth will be lost. Still, I would not recommend the use of tobacco, because it is not a pleasant habit, but the use of some stiff chewing gum is very beneficial, and I think should be recommended and encouraged rather than discountenanced. It is not necessary that men, women, girls and boys should be working their jaws morning, noon and night, but they nearly always have a few minutes after each meal in which they can give their

teeth this exercise by the use of gum, and I think it is of great advantage.

I think the teeth should knuckle. I think the ideal shape of teeth is the ovoid—teeth that come straight up, as Dr. Cone has said, and I think the knuckling of the teeth has a tendency to prevent decay. I think that in the normal set of teeth, where the knuckling is pronounced, a very desirable thing is an interproximal space, though an interproximal space in some mouths would tend to retain the deposit of fermentative products and thus injure. An instrument should pass between the teeth at any point without wounding or injuring the gums. In the restoration by fillings I believe in rounding them out, even if you have to round them out abnormally or to an extra amount. If this is not permitted on account of overlapped teeth, they would better be cut off and crowned with such teeth as will not so overlap.

I believe that in the fitting of bands to teeth, if we use bands for crowns, that the bands should be festooned so that they pass as far under the gums anteriorly and posteriorly as they do approximally, that the greatest care should be taken with the natural root that this crown is to be placed upon, that the edges and margins of this band should be well shaped to this festoon and well beveled and rounded, and I believe also that the root of the tooth should itself have a great deal of contouring done to it; that is, it should be much smaller above the gingival line than beneath the gum, so that the harder you drive the band on the tighter it hugs the tooth. In a normal case, where the tooth has not been fractured or broken, the driving on of the band will not wound the gum or hurt it, and the insertion of a crown is practically painless, except in the final setting, when the cement may cause the gum to smart for a minute or two.

I believe in those cases where we do not succeed in securing a well-fitting and comfortable crown it is frequently because of the crowding out of cement into the proximal spaces, underneath the margins of the gums, which is too seldom removed, so that these particles of cement hang underneath the free margins of the gum, if there is any tendency to pyorrhea or loosening of the teeth, and I have seen cases where there was a lump of cement as big as the head of a lead pencil taken out that had been crowded into a pyorrhea pocket. I believe if this excess of cement is not carefully

removed it means a loosening and eventual loss of the tooth at some time. Therefore the picking out of cement after setting crowns is, I believe, one of the most important prophylactic measures for the preservation of the crowned teeth.

I believe fully 25 per cent of the teeth that are crowned for patients pretty well along in life are more or less diseased, and are lost simply from the lack of this care in not picking out the cement around the pockets that have perhaps not been filled up after treatment for pyorrhea, or where there are loose gums, and in many cases where you are putting on a bridge, because of the failure to remove the cement that has been crowded under it.

I believe that for the majority of cases the Logan is the best form of porcelain crown, and that by burnishing the plate to a perfect joint to the end of the root, and filling in porcelain between we have one of the very best crowns that can be made. If this is not done, however, you will find that after the crown is inserted it overlaps the neck of the tooth, and you will simply have the same existing conditions as you would if you had made a very large approximal filling, or any other cavity filling hanging over the gum line, or over the edge of the cavity where food would collect, and if allowed to remain the gums will become inflamed and diseased, giving a chance for the development of pyorrhea and other pathological conditions in a very short time. Therefore if you do not bake your own porcelain crowns, and are using the manufactured article, see that they contour to the periphery of the root. Take a little piece of carbon paper and get the size of that root, or take the measure of it with a piece of copper strip, and then grind the base of your Logan crown round so that it is the same size and contour as the root, then you will not have overlapping edges, but edges which come in close proximity and in horizontal line with the periphery of the root. So many are lost from pure lack of that little attention.

I believe in grinding away as far as it is possible, and by that I mean grinding away all pits and irregularities, sharp broken points of cusps, defects, natural, congenital or acquired in teeth, and rounding and smoothing them up. I am afraid I will not be supported in this idea, but I maintain that it is proper treatment. I believe sometimes in cutting a tooth to the filling, rather than adapting the filling to the tooth. I know a great many dentists

that do not use corundum stones in finishing their fillings, or carborundum stones (they are worse still), but use some instrument (Black finishing burs), that they may not breach or injure the enamel. If I fill a cavity so deep in the crown of a bicuspid or molar that my corundum points will not reach it I grind the cusps off so as to gain access to it. I have had hundreds of cases come to me with split teeth, where a crown cavity has been excavated so deeply between the cusps of bicuspids that either the inner or the outer cusp has split off.

When you are called upon to insert a very large filling, such as you frequently find necessary in the lower first molar, you find the inner cusp standing up very high and shelving off. You build your filling high up to complete it, and still find a large part of the cusp sticking up anteriorly or posteriorly next to the tongue. I grind that cusp off, because I know that if I do not, and the patient gets some hard substance between the teeth, and the pressure comes upon that filled tooth, it is not going to injure my filling, but will split that side of the tooth off. Many of you have seen the inside cusps of the lower molar teeth split off, sometimes down below the gum leaving the filling intact and in perfect condition, and you had to build up a small, rounded edge there with amalgam or gold, even a few months perhaps after you inserted the original filling.

So that I am a great advocate of grinding teeth. Use sandpaper strips approximally between the teeth; if you have a diseased condition of the gums, if you have roughened edges, I use them in finishing fillings, even if I cut the gums a great deal. I believe it is a prophylactic measure and tends to preserve the filling. You need not fear grinding off the cusps. We grind teeth all to pieces sometimes for various purposes, and put in teeth which, as the speaker said last night in welcoming this society, are better than those originally put in by Nature. That does not apply to the majority of cases of course, but we sometimes do it. We sometimes have mouths where the teeth are worn down and we have to put in big fillings and leave a long cusp inside or outside; eventually hard masses of food will strike that and break it off. Therefore I believe the grinding of teeth is a prophylactic measure to prevent future accidents.

Where women are given to biting threads we find occasionally

the teeth chipped off at the cutting edges. I grind that enamel off with a stone of some kind and then polish it down, so that they find great difficulty in biting thread with them. I round the edges up so that they cannot get the lateral pressure which breaks the teeth.

Of course if the teeth were the best in the world, if we had the very best development, and were given the best and most simple foods, the teeth might become so hard and so dense that there would be no necessity for dentistry at all, but considering the way the majority of us live, whether of high or low civilization, we find the teeth have taken on forms and are surrounded by conditions that demand extraordinary measures to preserve them.

I believe in grinding off elongated teeth, also teeth that have become a trifle loose, where part of them has been crowded out or lost through the wearing of plates. I sometimes cut off elongated centrals, upper or lower, a quarter of an inch, and make them short. I have seen bridges and crowns that were extraordinarily well done put on in a place where they were of no use in a very short time, just because the operator did not wish to grind the natural teeth. I hardly ever saw a set of teeth which could not be improved by more or less grinding—grinding off long cusps and irregularities, tending to point the cusps of the teeth in lines of beauty to correspond with the shape and contour of the face. By so doing you can sometimes cause irregularly-shaped teeth to come into position, and thus prevent extra strain being put upon weak teeth and bring the greatest amount of stress upon sound and solid teeth. Therefore I claim there is great advantage gained in grinding teeth, for esthetic purposes, for utility and prophylactic purposes.

And now one word upon the question of combating this susceptibility to decay. I think that no tooth is so poorly constructed that it will decay after it has been extracted and laid away in your drawer. I think some of the various experimentists have proven that there is very little difference in the comparative strength of the teeth of the sanguineous, lymphatic, bilious or other temperaments. There is no temperament that stands alone. Every human being has a conglomerate of all the various temperaments, just one predominating a little over the other here and there, so that we class them to correspond with the predominating feature. Now

in those individuals whose habits of life are such that the digestive tract becomes deranged, with lactic and acetic acid being formed in their stomachs and various yeast plants having their growth, the assimilative processes are very poor, and they are not as well nourished as they might be, either because of these fermentative processes, or because after the food is masticated the saliva has deteriorated in quality, is deficient in ptyalin, and the perfect digestion of starch is inhibited. The saliva sticks to the teeth and undergoes putrefaction, and its slippery, slimy condition favors the retention of hydrocarbonous foods, thus setting up a condition that is one of the most effective means of deteriorating teeth that would otherwise last throughout the life of the individual.

I believe, as Dr. Patterson has said, that the higher types of civilization have the best teeth. It is true they do not have the hairy chest and back and the bulldog jaw—the protruding jaw of the animal, or exaggerated cusps and crowns of teeth, but just as the steel watch-spring is more useful and lasting than the piece of cast iron, so the slim, trim muscle that is fitted for its use will outwork, and do better work, and stand a greater strain than the heavier, coarser muscle. I believe the higher the civilization the closer knit and the more resisting and powerful is the tissue. I believe that the ordinary man will outwear the horse every year that he lives. It has been proven again and again that man can outdo and outwear the best horse ever foaled in a journey of any length. The man cannot go as fast for a little while, but he will outdistance him in the long run, and the highly civilized muscle or tooth will outwear the big, heavy one. We must take into consideration with other things the point of view. We cannot look at it, as is the favorite method, from just one aspect of the crystal of life, we must look at it from all sides. In considering the matter of the life of a tooth we must realize its interdependence upon the saliva, upon the tongue, upon the elbow grease that carries the tooth-brush and powder, upon the assimilation of food and digestive operations, their effect upon the blood, and the conditions of other organs in the animal economy, from disuse or abuse, for we know that when one organ is out of order it tends to produce disturbance and disease in other organs.

Dr. Hungerford, closing discussion: There was one opinion advanced in this discussion which is entirely opposed to my indi-

vidual views upon the subject, namely, that pyorrhea is the product of malnutrition. While it may be a fact that in the case of these people who are ill-nourished the cure of this disease may not progress as rapidly and the tissues be restored as readily as in the case of the well-nourished body, neither will a cut or wound heal as readily in persons of anemic condition as in those whose blood is kept in proper condition by plenty of nourishment. But it has never been satisfactorily proven just what the cause of pyorrhea is, and I think the assertion that it is a sequel of malnutrition is rather a wild statement to make in this day. Prophylactic measures will prevent it universally, and I thoroughly believe that it is of local origin, and like any other local sore, it may not heal as readily in a diseased body as it would if the condition of good physical health existed. But in no sense is pyorrhea the result of malnutrition, any more than a cut is the result of malnutrition.

Someone spoke about physical exercise and physical education. It is not always size and strength that determine the ability of the body to resist disease. We all know that those magnificent specimens of physical development are the ones who yield so readily to tuberculosis, and there is no animal that breaks down so rapidly as the human athlete. There is no soldier in the armies of the world that is so tough and so capable of resisting the effects of strain and exposure and accident as the city-bred clerk—the office-boy. When he enters the army he may be given to dissipation the first few weeks, and may get down with the camp fever, or various other little disturbances may put him on the sick-list for a while; but when he gets on his feet again he is just as good as ever, while the country-bred farmer boy starts on his career with great éclat, but does not have the stamina that will enable him to keep up to the mark later in his soldier life. That is in accordance with the statistics of the War Department. The question of perfect physical development embraces the proposition that all the various organs of the body are adaptable to the condition in which they are placed. If a change is made from one environment to another there immediately commences a disturbance; the system must adapt itself to the new conditions, requiring a change of base, a change of equilibrium, and in the case of the city-bred clerk, whose physical condition may be but slightly developed, this equilibrium is very readily established, while the other fellow, whose muscles are set

and hard, does not readily adapt himself to the new environment. Therefore this question of physical development does not appeal very strongly to me.

This question of marriage I think might very properly be controlled if there were laws instituted preventing diseased people from marrying. That reform was attempted by Marcus Aurelius when he was emperor of Rome. He changed the marriage laws five or six times, but the result convinced him that there was no human-made law that would govern human appetites. You must reform yourselves before you undertake to establish standards for the women you are going to marry.—*Western.*

NEURASTHENIA MANIFESTED IN THE TEETH. By J. H. Carter, L. D. S. I., D. D. S. (Phil.), Leeds, Eng., in *British Dental Surgeon.* The following case, which first came under my notice in 1899, has been treated off and on by myself and partner up to the present time, puzzling and worrying us both very much. Mr. ——, a gentleman about fifty years of age, residing near Leeds, of fair complexion and healthy appearance, called, desiring me to scale and polish his teeth, also to remove any sharp edges I could find in connection with them. This I promptly did. I should explain that his mouth appeared normal and his dentures better than the average. In a little time he came again, complaining of roughness behind the lower incisors. These were carefully reexamined and some further scaling done to remove any possible fragment of tartar that might have been overlooked on the previous occasion; also I thoroughly polished the lingual surfaces again. To my surprise, in a week or two he again called with the same complaint as before, especially in connection with the two central incisors. I did not quite know what to do, being satisfied this roughness did not exist, but as he was so persistent I repeated the polishing process and polished as I never did before, particularly their approximal surfaces. Each time on going away he expressed satisfaction and said they were better.

In a month or so my patient called and remarked that he was more convinced than ever that there was a roughness; that this bothered him extremely, his attention being perpetually drawn to it by the annoyance it caused. He compared it to the feeling as if the tip of his tongue were rubbing against sandpaper; indeed,

he had been to his doctor, who could find nothing wrong, and who referred him back again to me, as it was quite a dental case. My patient suggested the advisability of having the two teeth extracted, but to this of course I demurred. Wondering if there was anything wrong with his tongue I examined this organ, but it appeared quite healthy and normal. Thinking the trouble might be partly mental or imaginary, and feeling that doing something was the best way of getting the thing off his mind, I did still further polishing. Time went on, and he hailed me from his carriage, stating that he was no better and what was to be done? In my despair I suggested his calling again, and an appointment was made, but not being able to find anything wrong when he came, I told him to divert his mind from his teeth; that his tongue must be morbidly sensitive, and that he had got into a way of fidgeting about it. In order to thoroughly polish the sides of these teeth, as they were set very closely together, I had him wear some tape between them for the purpose of separating, so that I could use a polishing disk or other means. At the next visit he cheerfully informed me that the presence of the tape had nearly cured him. This gave me the idea that if only all the interstices were filled up I should succeed, so I packed each space with gutta-percha and made all very smooth. To my great annoyance in a little time he called, saying this material had become loose and come away. I saw there was no good in renewing it, for the little movement in each tooth had destroyed the adhesion, and I was sure nothing would hold. Feeling that my patient might be losing confidence in me and perhaps go elsewhere, and thinking a change of dentists might be of advantage, also being heartily weary of the matter, I suggested that my partner should take him in hand. He, knowing the history of the case, adopted very heroic treatment, passing files and disks between the incisors, rounding off everything in all directions, and polishing to such an extent that even the cutting edges were made round like knobs. As all this treatment failed as before, my partner recommended the wearing of a gold shield or plate, covering the lingual surfaces of all the six front teeth and affixed by clasps to the bicuspids; this arrangement afforded some relief and it was worn for a considerable period.

About this time I was again accosted in the street by my pa-

tient, who complained that he was not comfortable and did not like wearing the plate; also he did not know why I had transferred him to some one else, and desired me to take him in hand again. Feeling that this plate was likely to cause damage, a happy inspiration came to me. I suggested discarding it and crowning, or rather encasing, the two offending teeth with gold. This I did and matters were improved a good deal, yet the case is not altogether satisfactory. I should explain that one of the lateral incisors, not being crowned, is sensitive where the enamel has been polished away; this tooth is now much shorter than its neighbors and appears to be getting much abraded. I saw the patient recently, and was much discouraged on being told that his thoughts were still constantly recurring to his teeth. Almost from the beginning my diagnosis was that either something was wrong with the tongue or the evil was imaginary; if the former, then it must be due to exaggerted or enlarged papillæ, or abnormal sensitiveness. This troublesome case at last got on my nerves, and I was in dread lest I should again have my friend stopping me to say that he was no better, and what was to be done?

I have recently been in correspondence with his doctor regarding him, and he writes: "I am of the opinion that, for the last two or three years he has suffered from neurasthenia, connected with or due to business anxieties. During this time he has had the great responsibility of a failing business, in which not only his own fortune, but those of his brother and sisters have been involved. Two or three years ago he complained much of right brachial neuralgia; after this had troubled him for some months he suffered from left intercostal neuralgia and wandering pains about the neck and sternum, making himself and his doctor anxious as to the possibility of angina; finally a spasmodic condition of the tongue muscles, with complaint of the sharp edges of his teeth revealed the neurasthenic neurosis. I must say that I for a long time attributed all these things to irregular gout, as there was often an accompanying lithæmia." One authority says of neurasthenia, it is "a peculiar condition of the nervous system, a deviation more or less from the normal state and characterized by a loss of resistance, the latter in its turn producing an increased irritability and debility." Another says it is "a morbid irritability, an irritable weakness, an exaggerated sensibility. All kinds

of unpleasant sensations and even vivid pains are of usual occurrence in neurasthenic individuals. The development of neurasthenia is specially favored by overwork, more particularly of a mental kind, by late hours, disappointment, grief, and care. It is of a subjective nature, and even in the most painstaking examination no objective foundation can be found, so that it is generally regarded as imagination or exaggeration; it causes the patient, however, enough trouble and discomfort to make him lose his happiness for a considerable period of his life."

In conclusion, this case may serve to suggest that we occasionally have mysterious and inexplicable symptoms presenting themselves, without sufficient or assignable cause; cases which we are unable to diagnose satisfactorily, and which perhaps belong more to the domain of the medical man than the dental surgeon.

SHOULD ROOT-CANALS BE ENLARGED? By Dr. W. C. Gowan. Reference to reaming, drilling, scraping and acid-cutting in root-canals is so frequently met with in our current literature as to indicate that some dentists seriously attempt to enlarge canals in all cases before filling them. Others solemnly mention schemes of canal enlargement as a remedy for difficulties encountered in small flattened and crooked canals in roots of unknown form *in situ*. Each refers to his favorite method of canal enlargement as if it were an entirely feasible and harmless operation.

To dispel if possible this mischievous delusion let me make a few remarks and one suggestion: After years of study, practice, observation and experiment, I find root-canal enlargement *unnecessary* where it is possible and *impossible* where it seems necessary. This conclusion refers to canals in which pulp extraction and root-filling are to be practiced for the benefit of the tooth.

It is evident to those who have examined a large number of canals in extracted teeth, and have observed the operation of instruments in them, that a majority of canals can be better cleansed and better filled without enlargement, for the natural surfaces of these canals are smoother than any drill or acid will make them, and also better adapted to the easy sliding of a broach or root-filling to the apical foramen.

Knowing that we have no root-filling impervious to water or

bacteria, it is obvious that the smaller the canal when filled the less will it leak and the less foul matter can it contain, as a result of leakage from either end. These two considerations should alone be sufficient to forbid the enlargement of any reasonably round, straight, or easy canal, or any canal in which a broach can be operated.

But what of the small, crooked, flat, irregular canals, situated as they are in roots of corresponding form? If any man, by the use of drill or acid, thinks he can enlarge these to their apical foramen without anywhere perforating the side of a root, let him try his method in such canals in extracted teeth, where he can see the result.

Let any advocate of reaming, drilling, scraping, or acid-cutting in root-canals come prepared to a clinic and enlarge from pulp-chamber to apical foramen any four out of five canals in extracted teeth which I shall submit to him. We want a few demonstrations of this kind to show what actually happens. It will be admitted, however, that successful performance of the mere mechanical operation in an extracted tooth, with all the advantage of light and position, and certainty as to the form of the root and position of the foramen, does not bespeak a like success in the mouth, where these advantages are wanting, and nothing is known except what is seen or felt at the coronal end of the canal.

The vital phenomena to be reckoned with in a practical case remain to be considered even if no mechanical obstacle prevented a drill or a broach, wet with sulphuric acid, reaching the apical space through the foramen. So I doubt both the possibility and the wisdom of such an operation. Interference with the apical tissues and the larger body of root-filling necessary in a drilled canal are in themselves objectionable, while a part of every flat canal must remain unclean after all that drilling can do. The weakening of the root, the danger of irritation, perforation, infection, breakage of instrument used, the time and labor lost and the discomfort of the patient, ought surely to be considered before attempting an absurd operation in the mouth which you cannot perform in the laboratory.

Personally, I find no reason to enlarge "easy" canals, and no hope of success in any method proposed for difficult ones, so I do not ream at all. If a canal is too small to admit the finest

broach, and all has been done that cleanliness, drugs and dryness will do, why not fill over it and enjoy the chances in its favor rather than incur the alternative labor, vexation and danger, to make its chances worse?

To the commandment, "Thou shalt remove all pulp," I desire to render obedience, provided, "if thou cans't" is added in amendment. But where the finest broaching methods, assisted with such solvents as papain, fail to remove a pulp, it is surely better to let it alone than to blindly drill the course of the canal to its first curve and there perforate the side of the root. And if the canal is too small and crooked to admit a broach, how is sulphuric acid to help you?

The driller of canals may rest assured that no operator, however superior to himself, can successfully operate a broach in a crooked canal in which any kind of drilling has been attempted. For the point of any drill, however flexible the shaft, upon arrival at a curve will make a pit in the wall of the canal which a broach point will not pass.

Try any drill made or any sulphuric-acid process in a little flat canal found in a crooked root, first noting the position of the apical foramen under a magnifying glass. Push your drill or your acid to a finish, and note what that finish is. Try several canals and observe carefully the result. Split the roots afterwards with a hammer and examine the results of your work from the inside; use your glass. Whoever will try these simple experiments will need no one to tell him how absurdly futile and dangerous these canal enlargement schemes are.—*Dominion.*

NEURALGIA—A PECULIAR CASE. By G. F. Hitchcock, D. D. S., Plymouth, Ind. Mrs. B—, middle-aged, some three years ago commenced to suffer continually with severe pains in her jaw on the right side, and physicians here diagnosed the case as chronic neuralgia of the inferior dental nerve. She went to Ft. Wayne and was operated upon, the nerve being severed, and there was no return of the pain for nearly a year, when it commenced again so severely that she had to be kept under the influence of morphin. She was again operated upon by the same surgeon, who found that the two ends of the nerve had united. This time she had relief for only a few months, and then had to undergo a similar

operation, with relief for only a short time as the result. These three operations consisted of making an incision through the side of the face in the usual way, which resulted in leaving a large scar which disfigured her greatly.

I was called in when the pain had commenced after the third operation, and found the following conditions: The patient was unable to move jaw without the greatest pain, unable to take any nourishment except of a liquid nature, in a bad way physically, breath very offensive owing to the inability to cleanse the teeth properly, and so nervous that it was with the greatest difficulty I could make an examination. After some study I concluded to operate, and the patient was placed under an anesthetic. It was with difficulty that her jaws could be opened, as the muscles were set from the jaws being held in the same position for so long. I removed the third molar on the affected side, the first and second molar being missing, and with a trephine in the engine followed the course of the root downward and backward until I reached the nerve, where I found the two ends united and much enlarged at the point of union. The nerve was then cut away, and with a large broach I cleaned out the canal both ways as carefully as possible. After washing it out thoroughly I used pure carbolic acid and again hot water, and then with a metal syringe injected hot paraffin as deeply as possible, with the intention of preventing the two severed ends from uniting again. There was no hemorrhage to speak of, owing no doubt to the blood-vessels having been affected by the previous operations. The remaining teeth on the lower jaw were then extracted.

The following day the patient was able to sit up and take some nourishment, and could move her jaws very freely, so was instructed to move them frequently. The only pain or inconvenience she suffered was the soreness usually attendant upon the extraction of teeth. Since that time she has steadily improved physically, has the complete use of her jaws, and will have a lower plate in a few days. The idea of using paraffin was new to me, but the results seem to prove its worth. The advantage of an operation like this is that we can do away with disfigurement of the face.—*Summary.*

The Dental Digest.

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Where All Communications Should be Addressed.

Editorial.

ANOTHER CHAPTER IN ILLINOIS STATE BOARD SCANDAL.

Our readers will remember the scandals which were unearthed four years ago in the affairs of the old Illinois State Board of Dental Examiners, in which Dr. J. M. Smyser and Edward Flynn were the chief figures. Indictments were returned by the grand jury at that time, but the cases were not brought to trial for several reasons, one of the principal ones being that Flynn had immediately left town and could not be located. He recently returned and was arrested, and on Thursday, December 7, 1905, before Judge Ben M. Smith in the Criminal Court, a jury returned a verdict against each defendant, fining them $300.00 and imprisonment in the penitentiary, on one of the indictments found by the grand jury in the year 1901 against them.

The indictment upon which they were tried was the one charging conspiracy to defraud the State of Illinois, and the evidence tended to show that in December, 1900, Dr. Harry N. Messenger, having been convicted in the Justice Court of practicing dentistry without a license, was approached by Flynn, who was then a detective for the State Board of Dental Examiners, and referred to Smyser to get a temporary license. Messenger stated that he got this from Smyser and paid him therefor $25.00. Messenger also testified that in May, 1901, he got a permanent license to practice dentistry from Edward Flynn at the Morrison Hotel and paid him therefor $150.00, and that he and Flynn went to the County Clerk's office and he had this license registered. From other testimony it appears that soon afterwards this record in the County Clerk's office was erased, and one of the witnesses stated that Flynn was often seen behind the desk in the County Clerk's office. Other witnesses and

hand-writing experts testified that this erasure was made after we had started the agitation against the Board.

Messenger testified that the name of Smyser was on this permanent license, and from the County Clerk's record it appears that it was dated December 29, 1900, though Smyser had resigned as Secretary of the Board fully two months before then, but was still a member of the Board. It also appeared that the name of Dr. Reid, the other member of the Board situated in Chicago, was not upon the permanent license, and that it was a custom with the Board about that time for Smyser, as Secretary, to send licenses in blank to the other members of the Board, except Dr. Reid, they living in the southern part of the State, and they were signed up and returned to Dr. Smyser.

Among the witnesses for the prosecution were Drs. H. W. Pitner, of Fairfield, Ill., Drs. J. G. Reid and H. N. Messenger of Chicago, and clerks in the County Court. There are three indictments against the two defendants jointly, and four against Smyser alone, but they were convicted on one. They are out on bail, and a motion for a new trial has been asked by both and will be heard in December. Their conviction is a great victory for honesty in the conduct of the affairs of state dental examining boards.

Notices.

EASTERN ILLINOIS DENTAL SOCIETY.

The Eastern Illinois Dental Society held its first annual meeting at Tuscola, Nov. 21, 1905, and elected the following officers: President, S. A. Campbell, Mattoon; Vice-president, J. E. Adams, Paris; Secretary, A. E. Boyce, Tuscola; Treasurer, Guy F. Corley, Mattoon; Librarian, Paul Berlau, Paris. The next meeting will be held at Marshall on the third Tuesday in March, 1906.

MICHIGAN STATE BOARD OF DENTAL EXAMINERS.

At the last regular meeting of the Michigan State Board of Dental Examiners, held at Ann Arbor, Oct. 31-Nov. 4, 1905, the following officers were elected for the ensuing year: President, Walter C. McKinney, Saginaw; Secretary, Albert L. LeGro, Three Rivers; Treasurer, Chas. Oakman, Detroit. Reciprocity with Oklahoma was ratified. Michigan now interchanges with Canadian Northwest Territories, New Jersey and Oklahoma.

ALBERT L. LEGRO, Sec'y, Three Rivers.

ARIZONA BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners of Arizona will hold its next meeting for the examination of applicants at Phoenix, Dec. 27-29, 1905. Examination fee $25. All wishing to take examination will correspond with

W. P. SIMS, Sec'y, Bisbee.

ALUMNI ASSOCIATION OF NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

The Alumni Association of Northwestern University Dental School will hold its annual clinic Tuesday, Jan. 16, 1906, at University Bldg., corner Lake and Dearborn Sts., Chicago. All practitioners are invited to attend.

G. B. MACFARLANE, 70 State St., Chicago.

PENNSYLVANIA STATE BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, Dec. 12-15, 1905. For papers and cards of admission address Dr. N. C. Schaeffer, Secretary Dental Council, Harrisburg, Pa.

ESSEX (MASS.) DENTAL ASSOCIATION.

The Essex Dental Association held its annual meeting and banquet Nov. 2, 1905, and elected the following officers: President, E. O. Richards; Vice-president, M. E. Davenport; Secretary and Treasurer, Percival Phillips; Librarian, C. K. McGlew.

LA SALLE COUNTY (ILL.) DENTAL ASSOCIATION.

The annual meeting of the La Salle County Dental Association was held at Ottawa, Nov. 7, 1905, and the following officers were elected: President, A. T. Olmstead, La Salle; Vice-president, J. C. Curry, Streator; Secretary, L. E. Jordan, Ottawa; Treasurer, T. H. Barrett, Ottawa; Librarian, R. Moran, Kinsman.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, Jan. 16, 1906, beginning at 1:30 p. m. sharp. All applicants for examination must bring diplomas from reputable dental colleges or affidavit of having been engaged in the practice of dentistry for at least three years immediately preceding said examination. Instruments and materials necessary to do all kinds of operative and prosthetic work will be needed at this examination. Vulcanizer and lathe will be furnished by the Board. All applications must positively be in the hands of the Secretary by Jan. 9.

G. W. COLLINS, Sec'y, Vermillion.

MADISON DISTRICT (ILL.) DENTAL SOCIETY.

The Madison District Dental Society held its annual meeting in Alton, Nov. 1, 1905, and elected the following officers: President, C. C. Corbett, Edwardsville; Vice-president, J. M. Barcus, Carlinville; Secretary and Treasurer, E. W. Burroughs, Edwardsville.

LATEST DENTAL PATENTS.

800,193. Making shell gold crowns for teeth, Samuel E. Wilhelm, Sac City, Iowa.
800,387. Dental retainer, John Mills, Brantford, Canada.
800,401. Tooth-power bottle, Mark T. Rounds, South Portland, Maine.
800,498. Dental waste-cotton receiver, Lyman L. Sheffield, Toledo, Ohio.
800,787. Holder for tooth picks, Eduard Bergmann, Vienna, Austria-Hungary.
800,981. Air-blast attachment for dental engines, James W. Buchanan, Savannah, Georgia.
801,056. Dental matrix, Fredrik E. Andersen, Red Wing, Minn.
801,215. Dental-engine attachment, Franklin O. Cates, St. Louis.
801,840. Mouth prop, Joseph B. Besant, Saranac Lake, N. Y.
801,841. Mouth prop, Joseph B. Besant, Saranac Lake, N. Y.
801,911. Artificial teeth, Carl Rauhe, Dusseldorf, Germany.
802,099. Dentifrice, Eustace H. Gane, New York.
802,408. Cervix-clamp for use in dentistry, Wm. A. Rowe, Gloucester, Mass.
802,483. Dental appliance, Bert G. Simmons, New Brunswick, N. J.
802,683. Dental swage, John R. Comins, Syracuse, N. Y.
802,711. Rubber-dam sheeting, Wm. F. A. Schrader, Brooklyn.
802,989. Dental instrument, Albert P. Johnstone, Anderson, S. C.
803,045. Dentists' cervical clamp, Lisle H. Babcock, Canisteo, N. Y.
803,198. Saliva-absorbing roll holder and shield, Richard A. Sprake, Denver.
803,474. Dental applicator, James W. Dennis, Cincinnati.
803,475. Dental applicator, James W. Dennis, Cincinnati.
803,995. Tooth-brush, Wm. S. Davenport, Paris, France.
804,116. Artificial tooth for bridgework, Harry B. Gregory, Newberry, Mich.
804,200. Apparatus for the correction of irregular teeth, Varney E. Barnes, Cleveland.
804,211. Dental switchboard, Monroe N. Callender, San Francisco.
804,229. Forceps and the like, Thomas C. Hutchinson, Decorah, Iowa.

News Summary.

WARREN PORTER, 75 years old, a dentist of Danvers, Mass., died Nov. 13, 1905.

W E. EAGLESON, a dentist of Lafayette, Ind., died Nov. 19, 1905, of tuberculosis.

W. T. SENTER, a dentist of Danbridge, Tenn., died Nov. 3, 1905, of consumption.

DAVID STORY, 73 years old, a dentist of New York, died Nov. 5, 1905, at Watonga, Okla.

T. O. BRAMLETT, a dentist of Atlanta, Ga., died from congestion of the brain Nov. 15, 1905.

F. E. HOWE, 50 years old, a dentist of Ithaca, N. Y., died Nov. 19, 1905, after a long illness.

J. P. VON LACKUM, 41 years old, a dentist of Waterloo, Ia., died very suddenly Nov. 7, 1905.

O. C. WATKINS, 45 years old, a dentist of Eaton, Pa., died Nov. 19, 1905, from kidney trouble.

F. F. DURAND, a dentist of Maplewood, N. J., 62 years old, died Oct. 30, 1905, from heart disease.

BYRON A. CARMAN, 64 years old, a dentist of Plainfield, N. J., died Nov. 17, 1905, from heart disease.

RANDALL R. RYKERT, 61 years old, a dentist of Attica, N. Y., died Nov. 10, 1905, from Bright's disease.

MICHAEL CONNOR, 62 years old, a dentist of Brooklyn, N. Y., died Nov. 21, 1905, after a lingering illness.

R. ALLISON MILLER, 76 years old, a retired dentist of Huntingdon, Pa., died Nov. 1, 1905, of heart trouble.

J. L. BROWN, a dentist of Argenta, Ark., 47 years old, died Nov. 20, 1905, after an illness of seven months, from tuberculosis.

E. T. BREEDING, 27 years old, a dentist of Glasgow, Ky., died from concussion of the brain, caused by a fall, Nov. 22, 1905.

WINDY.—Some men waste half their wind in doing a thing and the other half in blowing about it afterward.—*Fisk Pneus.*

PECULIAR CASE.—(W. J. Hemphill in *Review.*) About six months ago I extracted the left upper first and second molars for a male patient fifty-seven years old, and now a third molar has come in.

MILK FLOUR.—A process for the manufacture of milk flour has recently been devised by a Swede, says the Medical Times. The product in its dry form is practically imperishable, and when dissolved in water may be used, it is said, for any purpose for which ordinary milk may be used. The cost of reduction to powder is nominal.

X-RAY EYE.—They had not been married very long, and that complete blissful trust which young husbands and wives have in each other had not yet been broken. But one morning wifie meekly remarked:

"I mended the hole in your trousers pocket last night after you had gone to bed, John, dear. Now, am I not a thoughtful little wife?"

Husband (dubiously)—Well—er—ye-es, you are thoughtful enough, my dear. But how the mischief did you discover that there was a hole in my pocket?"—*Answers.*

No Progress.—"My wife doesn't seem to be progressing, doctor," remarked the anxious husband.

"No," answered the physician; "when she gains a little strength she uses it all up trying to tell her friends what's the matter with her."—*Answers.*

Pulp Mummification.—I never mummify a pulp that comes to me in any other condition than freshly exposed. Some try to mummify pulps that are diseased, pulps with pulp-stones, teeth that are loose in the socket. That is where the failures come in. The pulp must be in a comparatively healthy condition.—Dr. Waas, in *Items of Interest.*

Combination Fillings; Gold and Tin.—If three sheets of gold, No. 6 or 8, and one of tin are folded in three, cut into strips and packed into a cavity, not only crowns but interstitial cavities in bicuspids can be satisfactorily filled, and such fillings have been found to last in mouths where other fillings have not proved a success.—Mr. Amoore, *Record.*

Crawcraw in England.—Mr. Dencer Whittles, a lecturer on dental pathology at Birmingham University, is reported (says *Med. Record*) as saying that numerous cases of crawcraw have been introduced into that city. Several instances are described in which the infection appears to have been transmitted from one individual to another by kissing.

Pulpless Teeth and Neuralgia.—Teeth without living pulps are never the cause of neuralgia. All cases examined by Dr. G. V. Black indicate that there has never been one case resulting from teeth with pulp removed. When apparently otherwise, examinations have not been thorough and portions of living pulp were certainly present.—James G. Atterberry, *Western.*

Fires.—J. H. McPherson, St. Anthony, Idaho, Oct. 29; total loss.—A. S. Cork, South Chicago, Ill., Nov. 20; loss covered by insurance.—C. H. Stearns, Owatonna, Minn., Nov. 19; loss $2,500; insurance, $500.—Warrent Van H. Filkins, Passaic, N. J., Nov. 20; total loss.—J. H. McBride, Tyler, Tex., Nov. 14; loss, $4,000; insurance, $2,500.—Dr. Crawford, Crandon, Wis., Nov. 4; total loss.

The Broach.—As I never use any other than a soft broach I find the most convenient and effective method of sterilization is to pass the broach through the flame of the alcohol lamp just before using it. It should be held a little above the flame to avoid burning it, and should not be withdrawn from the heat too quickly or the sudden cooling will harden it.—J. Leon Williams, *Cosmos.*

Impressions in Orthodontia.—The impression having been removed from the mouth and thoroughly dried, the small pieces are united to the larger ones by a cement made of celluloid cut with equal parts ether in alcohol. The larger pieces are united with wax outside the tray. To obtain a smooth model the impression is first coated with orange shellac varnish which should penetrate the impression deeply, when dry followed by a second coat of thin shellac, with a final coat of sandarac varnish.—B. Abell, *Register.*

MANY-SIDED MAN.—Who can beat this for a letter-head, asks the Kansas City *Journal:* W. P. Knote, attorney-at-law, M.D., N.P., harness, buggies, wagons, hog-tight fence, sewing machines, separators and ice. Farm implements. Breeding stables. Farm and city property, cattle, hogs, bought and sold. Money to loan. Legal instruments drawn; also teeth. Douglass, Butler county, Kan., U. S. A.

TO HASTEN THE SOLUTION OF GUTTA-PERCHA IN CHLOROFORM.—Chloropercha gets out of service now and then when it is much needed because of loss of chloroform through evaporation. To get it into shape again for immediate use, add the solvent and immerse the container in a dish of hot water. The chloroform begins to boil forthwith and the material is ready for immediate application.—*D. O. and L.*

HARMONY BETWEEN TOOLS AND WORKER.—(Mark G. McElhinney in *Review.*) To produce good results there must be harmony between the worker and his tools because the tools are simply extensions of the power of man. Every sportsman knows that a gun must fit the user and the same may be applied to the tools of manual labor. Attention to this principle will enable the worker to reach his highest efficiency.

TOOTHBRUSHES.—(I. T. O. R. in *Review.*) A brush with stiff bristles should never be prescribed. By the proper use of a soft brush the patient can keep the teeth clean and there is no danger of injuring the gums. It has been found that in most cases where a stiff brush was used for a long time the gums began to recede, exposing the neck of the teeth, and any dentist knows the result of a continuation of this condition.

LOCAL ANESTHESIA FOR EXTRACTION.—The pain of extraction is caused by the tearing of the alveolo-dental ligament; therefore if anesthesia by cocain is to be effective it must act on the nerve termini of this ligament. To insure the efficacy of the injection it must be made at the level of the mucous membrane, which adheres closely to the periosteum and consequently not too near the neck.—E. SAUVEZ, *Brit. Dent. Jour.*

ORTHODONTIA.—While there is no one best rule for regulating all cases, there is generally one best way of accomplishing the highest results in a given case. The highest aim should be to accomplish not only the greatest possible degree of beauty in facial form, but also an improvement in mental expression through the form. Movers of teeth there may be many, but of moulders of the face to the highest possible benefit there are not so many.—JOHN NUTTING FARRAR, *Record.*

ROBBERIES.—Perkins Bros., Birmingham, Ala., Nov. 13, $14.—Dr. Chambers, Quebec, Can., Nov. 8, instruments. The thief was caught and the instruments returned.—Wm. J. Hartnett, Stamford, Conn., Nov. 18; $50 worth of gold.—J. D. McMillan, Mt. Sterling, Ill., Nov. 1, $25.—Dr. Johnson, Danville, Ill., Nov. 3; $25.—Emmett Million, Louisville, Ky., Nov. 15; $150 worth of tools and supplies.—Ray Peters, Lancaster, O., Nov. 14; $20 worth of scrap and plate gold.—Bert George, E. Liverpool, O., Nov. 21; $150 worth of gold.

BRUSHING THE TEETH; FORMING THE HABIT.—Dr. Bethel told his little girl, when she was quite small, that he would give her a penny every day that she properly brushed her teeth, but she was to give him two pennies every day she failed to do it. Now when she is sixteen you could not pay her to neglect her teeth, and he has not for years had to deduct his two pennies. The habit has become fixed.—F. W. STIFF, *Summary.*

ORTHODONTIA: THE TIME TO BEGIN TREATMENT.—Correct and early diagnosis and treatment begun as early as five years will in many cases avoid and prevent serious cases that in later years would prove most difficult to treat with perfect success. The most serious cases of malocclusion are clearly indicated in temporary teeth and may be diagnosed as early as three years. Watch them and prevent growing deformities.—VARNEY E. BARNES, *Summary.*

OIL STONE.—Oil stones improve with age, if kept clean and well lubricated, but deteriorate if neglected and allowed to dry out any length of time. When fully saturated it is in its best condition, but if not cleaned the oil thickens and forms a coating on the surface. Kerosene oil in time hardens a stone and changes its quality; a saturated solution of caustic potash in water is preferable. Sperm oil is considered the best for edges.—B. BANNISTER, *Summary.*

PULP REMOVAL.—To harden the contents of root-canals and facilitate their removal after disintegration with arsenic, saturate a piece of cotton or spunk with a five per cent solution of formalin and place over the stump after removal of the bulbous portion of the pulp, being careful in multi-rooted teeth to have the cotton large enough to cover all of the stumps. Over the cotton place a Teague disk and pack temporary stopping or cement over the disk. Three days will effect complete devitalization and hardening.—JOHN I. HART, *Cosmos.*

LONG'S DENTAL MATERIA MEDICA AND THERAPEUTICS.—A Text-book of Dental Materia Medica, Therapeutics and Prescription Writing. For Students and Practitioners of Dentistry. By Eli H. Long, M.D., Professor of Materia Medica and Therapeutics in the Dental and Medical Departments of the University of Buffalo, N. Y. New (2d) edition enlarged and revised to accord with the new United States Pharmacopeia. In one octavo volume of 298 pages, with seven engravings and 18 colored diagrams. Cloth, $3.co, *net.* Lea Brothers & Co., Publishers, Philadelphia and New York, 1905.

TOOTHPICKS.—(Garrett Newkirk in *Review.*) Any medicine which corrodes steel instruments, such as sulphuric acid, iodin, etc., also the acid liquid of cements, may be carried conveniently on the point of a small wooden pick, with or without the addition of a bit of cotton fiber. For carrying medicine to a lower root canal a piece an inch long or less may be cut off and held with pliers. They are also very economical, for anyone who lunches at a restaurant may keep supplied from the little vase at the cashier's desk. If this should trouble a sensitive man's conscience he could buy a nickel's worth each year, but the restaurant method of supply has a peculiar charm.

GUM CAMPHOR IN MATRICES.—Results are not always satisfactory in the use of gum camphor to facilitate the removal of inlay matrices without bending. This is frequently due to the fact that American refined gum camphor is used instead of the Japanese refined, which is far less friable and works particularly well when slightly warmed and packed into place with warmed instruments.—L. A. JENKINS, *Items of Interest.*

DISINFECTION OF ULCERATED SURFACES.—To prevent the superficial coagulation of an ulcerated surface in the mouth, while disinfecting with bichlorid solution (1:2000, as hot as can be borne), it is always well to add three minims of acetic acid to every two ounces of the solution. Or the surface of an ulcer on the gum may be washed and disinfected with ten per cent argyrol instead of the bichlorid.—A. W. HARLAN, *Cosmos.*

ONE WHO MUST HAVE SUFFERED SOME.—Gossip (says the *Guernsey (Wyo.) Gazette*) is a humming bird with eagle wings and a voice like a foghorn. It can be heard from Dan to Beersheba, and has caused more trouble than all the bedbugs, ticks, fleas, mosquitos, coyotes, grasshoppers, chinch bugs, rattlesnakes, sharks, sore toes, cyclones, earthquakes, blizzards, small-pox, yellow fever, gout, and indigestion that this great United States has known or will know when the universe shuts up and begins the final invoice. In other words, it has got war and hell both backed up in the corner yelling for ice water.

TREATMENT OF FRACTURED LOWER JAW.—By James L. Tracy, M.D., Toledo, Ohio. A 6-year-old boy fractured the neck of the lower jaw on one side. To make a diagnosis it was necessary to give an anesthetic. He had just eaten his dinner, so the anesthesia was put off three hours. After the dressing was completed vomiting occurred, emptying the stomach of the meal. The food had become liquefied, however, and no damage came to the boy, because he succeeded in stretching the dressings sufficiently to let the mouth open. The query is, what would have happened if the dressings had not stretched, and particularly if the anesthetic had been administered as soon as the accident occurred? It would seem that a child under those circumstances would surely suffocate.

OILING OF HANDPIECES.—Many dentists, perhaps the majority, have noticed that their handpieces often work harder immediately after oiling than before, and have marveled thereat and wondered wherefore. Under these circumstances the common practice is to add more oil to the part already treated, or to another and more distant bearing, with the result usually of not only no improvement but of making a bad matter much worse. The seat of the trouble is almost invariably in the long-bearing of that end of the mandrel that grips the bur, and the remedy is to wipe all but dry after the first oiling, omitting a further application until later in the day—or week—according to the quantity of usage to which the machine is habitually subjected. The important fact to be borne in mind is that oil in a closely fitting long-bearing is a lubricant only when present in small quantity; in large quantity it acts as an adhesive. In short, little oil lets the machine go; much oil holds it fast.—*Dent. Off. and Lab.*

SIMON'S MANUAL OF CHEMISTRY.—A Guide to Lectures and Laboratory work for Beginners in Chemistry. A Text-book especially adapted for Students of Medicine, Pharmacy and Dentistry. By William Simon, Ph.D., M.D., Professor of Chemistry in the College of Physicians and Surgeons of Baltimore, and in the Baltimore College of Dental Surgery, etc. New (8th) Edition, thoroughly revised to conform with the eighth decennial revision of the U. S. Pharmacopeia. In one octavo volume of 643 pages, with 66 engravings, 8 colored plates representing 64 important chemical reactions, and one colored spectra plate. Cloth, $3.00, net. Lea Brothers & Co., Publishers, Philadelphia and New York, 1905.

TOO MUCH HUMIDITY.—An English paper tells a story of a man who was attacked by inflammatory rheumatism and was carefully nursed by his wife, who was very devoted to him in spite of his fault-finding disposition. His suffering caused her to burst into tears sometimes as she sat by his bedside. One day a friend of the invalid came in and asked how he was getting on.

"Badly, badly!" he exclaimed, "and it's all my wife's fault."

"Is it possible?" asked the friend in surprise.

"Yes. The doctor told me that damp places were bad for me, and there that woman sits and cries just to make the air moist in the room."

THOROUGH MASTICATION: BENEFICIAL RESULTS.—Exercise of the muscles with increased flow of blood and lymph both to the muscles and to the parts immediately surrounding; a cleansing action on the teeth; exercise of the alveolus, the salivary glands, and thorough change of their contents; a healthy excitement of the nerves, probably with beneficial effects on the tonsils; increase in the size of the muscles and the bones to which they are attached, with increase in their density, as also of the teeth and alveolus and widening of the base of the skull, and probably a corresponding widening of the nasal passages, preventing growth of adenoids; the tongue, having more exercise, will aid in the general expansion.—W. L. JEFFERSON, *Brit. Dent. Jour.*

SORROWS OF THE KING—

Upon another day the king
Possessed a heavy heart;
He said out loud: "Gol durn the thing!"
The clown woke with a start.

"Uneasy," the poor fool began,
When he that ruled cried out:
"No, no! It ain't my crown, young man,
That I'm concerned about;

"Oh, how my tooth does ache! Alas,
I've got to go and git
The blamed thing pulled—and laughin' gas
Ain't been invented yit!" —*Chicago Record-Herald.*

DENTIST, MONEY AND TEETH GONE.—A large number of people in Brooklyn are mourning the sudden departure for parts unknown of the proprietor of a "painless" dental parlor. His plan was to do a little work, ask a good-sized deposit, and set the next appointment several days ahead. In some cases, besides the deposit, he took gold plates to repair, also sets of false teeth, and he made all the appointments for the day after his departure, so that on the fateful morning there was a continuous stream of vengeful patients going into his office, but the bird had flown and they had no redress.

WILL FILL A LONG-FELT WANT.—(From *Four-Track News.*) A movement is on foot in Chicago to establish a $300,000 school, the express mission of which will be the salvation of the human stomach. Good! No part of man's anatomy is so abused as that curious little pouch known as the stomach. The average meal is prepared with reference only to the palate and with a careless disregard of the more important organs of digestion. If we can be made to see the enormity of our offense in insulting our stomachs with soggy rarebits, rich newburgs, leathery clams and other indigestibles it will be a great step toward driving dyspepsia into oblivion and toward the attainment of a happy old age. It is really remarkable what some human stomachs will endure before they enter an emphatic protest.

MAKING A PLATE LINE ON A MODEL.—(I. T. O. R. in *Review.*) Usually this is accomplished by making a mark with a pencil on the model where the border of the plate is intended to extend. The wax base plate is then trimmed so that the edge conforms to the outline of the mark. This would be satisfactory if the model and mark could be preserved after vulcanizing, but as this is impossible it is necessary to resort to some other method to accurately determine the location of the correct edge of the plate after it has been vulcanized. This is easily accomplished by cutting a small groove in the model at the border of the plate. The rubber will sink into this groove and show distinctly after being taken from the flask, and the operator can easily trim the surplus rubber from the plate with a feeling of security.

MEDICAL TREATMENT OF INGROWING NAIL.—Gasparini (*Jour. A. M. A.*) has found that copious application of dried powdered alum is sufficient to cure every case of ingrowing nail in his experience in about five days. The applications were never painful in the least, and the destruction of the pathologic tissue resulted in the formation of a hard, resistant and non-sensitive bed for the nail, a perfect cure for the ingrowing tendency. The non-toxicity of the alum, its easy application, and the fine results render it the chosen treatment for cases in which surgical intervention is not contemplated. He describes a series of cases and contrasts them with another series treated with other caustics with far less favorable and durable results. He applies a fomentation of soap and water for 24 hours beforehand and then pours the alum into the space between the nail and its bed, tamponing with cotton to keep the alum in place, and repeating the application daily. The suppuration rapidly dries up and pain and discomfort are relieved almost at once.

A Profession Demands and expects its members to have higher ethical aims than those prevailing in business.—J. D. Patterson.

Struck by Street Car.—Edward Blackshaw, a dentist of Urbana, Ill., was struck by a street car last month and seriously injured.

Shot While Hunting.—H. H. Joyner, a dentist of Paris, Tex., was accidentally shot by a companion Nov. 6 while on a hunting expedition.

Bankrupt.—W. E. Walker, a dentist of Chatham, N. Y., filed a petition in bankruptcy Nov. 14, with liabilities amounting to $2,486 and no assets.

Seattle Girl Wants to Buy Tooth.—According to newspaper report, a dentist in Seattle wishes to buy a sound incisor for a young woman patient, who will pay a good price for it.

Family Protective Association.—An organization with this name has just been incorporated in New York City, with a capital of $10,000 and with the object of "medical, dental and optical services."

Divorces.—Jerome W. Egbert, a dentist of Chicago, has sued his wife, who is now in India, for divorce, charging desertion.—Wm. J. Elder, a dentist of Norristown, Pa., was sued for divorce by his wife Nov. 23, on the charge of nonsupport.

Correction.—In our October issue, in reporting the election of the Southern Illinois Dental Society, we gave the name of the president as C. E. Uyningham. This is as it appeared in the newspaper report, no officer having furnished us an official notice. The name should have been C. E. Byington.

Poor-Box as Phone Collector.—A Brooklyn dentist who has a telephone in his office found that most people used it without thinking of payment. Not wanting to ask for the money for himself, he placed a Salvation Army poor-box beside the instrument, and his patients now almost invariably take the hint.

Senator Mitchell Dies From Dental Operation.—This month United States Senator John H. Mitchell of Oregon, who was recently convicted of government land frauds, had four teeth removed by a dentist and died the next day from hemorrhages which could not be controlled. His condition was complicated by diabetes.

Teeth Caused Insanity.—A man at Marion, Ind., was recently sent to the insane ward of the state hospital, being violent and dangerous. Soon after arriving he complained of severe pains on both sides of his face, and the physicians found that two third molars were ulcerated. The teeth were removed, the pain ceased, and the man is recovering his sanity.

Dislocated Jaw With Cotton.—Drs. J. H. Besore & Son of Ida Grove, Ia., send us the following letter that they received from a country patient: "Besoren dentist. Dear Sir. I write you these few lines to tell you that we cannot bring our girl back Monday as the other day she was putting cotton in her teeth and her jawbone was dislocated and the doctor said it would be some time before she could take the bandage off. As soon as she is fit we will bring her up and have you fix her teeth."

ANESTHETIC CRAZED PATIENT.—This month a man at Sag Harbor, L. I., while under the effects of an anesthetic given prior to the extraction of some teeth, suddenly became violent, kicked out the window in front of the dental chair, and drove the dentist and his assistant from the office. He soon recovered his senses, but the dentist declined to do any further work.

DAMAGE SUITS.—A man in Brooklyn is suing a "painless" dental company in New York for $10,000 damages, alleging malpractice.—A woman in Philadelphia has brought suit against a dentist of that city for $5,000 damages, alleging that while extracting a tooth he broke and badly splintered her jaw.—Nov. 18 a man at Providence, R. I., was granted $300 damages against a dentist for alleged unskillful work.

FATALITIES.—Three months ago a man at Indianapolis had a tooth extracted, and ulcers soon appeared in his mouth and throat. He had daily treatment for several weeks, but there was no improvement, and Nov. 5 hemorrhages set and he expired five days later.—Nov. 5 a woman at Rochester, N. Y., had twenty teeth extracted by a dentist, and died instantly on leaving the chair.—Nov. 18 a man at Mansfield, O., died from blood-poisoning, the direct result of an abscessed tooth.—Nov. 4 a woman, 24 years old, had some teeth extracted and died in the chair while under the influence of chloroform. It developed at the inquest that she had a weak heart.

ILLEGAL PRACTITIONERS.—Nov. 6 two men were arrested in the office of a dentist at Springfield, Mass., for practising without a license, and their employer was also summoned to court. The cases were continued.—Recently a man at Sacramento, Cal., was fined $50 for practising dentistry without a license. He appealed the case, and Nov. 2 the Superior Court confirmed the judgment of the lower court.—Nov. 1 a man in Brooklyn was arrested for practising dentistry without a license. The case was continued and he was held in bail.—Last summer three men at Utica, N. Y., were arrested for practising without a license and the cases were continued. They came up for trial Nov. 17, and one man was fined $50 and the other two $150 each.

THE AMERICAN TEXT-BOOK OF OPERATIVE DENTISTRY, in contributions by Eminent Authorities. Edited by Edward C. Kirk, D.D.S., Professor of Clinical Dentistry in the University of Pennsylvania, Philadelphia. Written by Edward H. Angle, M.D., D.D.S., Henry H. Burchard, M.D., D.D.S., Calvin S. Case, M.D., D.D.S., Dwight M. Clapp, D.M.D., William Crenshaw, D.D.S., M. H. Cryer, M.D., D.D.S., Edwin T. Darby, M.D., D.D.S., C. L. Goddard, D.D.S., S. H. Guilford, A.M., D.D.S., Ph.D., Joseph B. Head, M.D., D.D.S., Louis Jack, D.D.S., Edward C. Kirk, D.D.S., F. B. Noyes, B.A., D.D.S., Louis Ottofy, D.D.S., C. N. Peirce, D.D.S., J. D. Thomas, D.D.S., A. H. Thompson, D.D.S., James Truman, D.D.S. New (3d) edition, enlarged and thoroughly revised. In one octavo volume of 899 pages with 875 illustrations. Cloth, $6.00, *net*; leather, $7.00, *net*; half-morocco, $7.50, *net*. Lea Brothers & Co., Publishers, Philadelphia and New York, 1905.

EXAMINING BOARD AFFAIRS.—At the last meeting of the Connecticut Board 16 applicants were successful in passing the examination.—The Commissioners on Nov. 5 appointed Wm. B. Daly a member of the District of Columbia Board to fill the vacancy caused by the expiration of the term of Chas. W. Appler.—At the last meeting of the Maine Board 17 out of 19 candidates were granted certificates.—At the last meeting of the Massachusetts Board 21 out of 56 applicants were successful in passing the examination.—At the last meeting of the Michigan Board 20 applicants succeeded in passing the examination.—J. M. Meyer, a member of the Washington Board, has resigned because of his removal to Portland, Ore., and H. D. Brand of Tacoma has been appointed in his place.

ANESTHESIA BY THE RECTUM.—In 1847 Pirogoff demonstrated that general anesthesia could be produced by the introduction of ether vapor into the rectum. More recently another Russian surgeon, A. V. Krougilitch (says *Jour. A. M. A.*), has experimented with the method and claims that it has decided merits. The patient quickly comes under the influence of the vapor sufficiently to permit of major operations being performed. Occasionally, however, the anesthesia is insufficient, then he supplements it with a few whiffs of chloroform, repeating it in minute doses as required. Rectal anesthesia is, he says, the method of choice for operations on the head and neck, and he advises it also for other operations on account of its comparative safety, except in cases where it is contraindicated by inflammatory conditions of the intestines, peritonitis, etc. He precedes the administration, after a cathartic has taken effect, by washing out the intestines, followed by a general bath, and uses a special apparatus permitting the outflowing of the liquid formed by the condensation of the ether vapor. There is at first a slight intestinal irritation or tenesmus lasting only two or three minutes. There is rarely any preliminary excitement and only slight and transitory reactive phenomena.

ACCIDENTS.—Nov. 8 a woman at Los Angeles, Cal., was given too much chloroform for the extraction of some teeth, and it took several hours' work at a hospital to revive her.—Nov. 18 a woman went to the office of a dentist in Chicago to have some teeth extracted, previously taking a dose of morphin to deaden the pain. In her nervousness she took an overdose and became unconscious before the dentist had a chance to do any work. She was revived, after treatment at a hospital.—Nov. 3 a woman at Williamsport, Ind., had some teeth pulled, a local anesthetic being used. Too much was evidently administered, or else she had an idiosyncrasy for cocain, as she was dangerously sick for several days afterwards.—Nov. 20 a young woman of Clinton, Ia., had a third molar extracted, and the next morning could not open her mouth. There were no signs or germs of tetanus or blood-poisoning, but the condition prevailed for several days and her recovery was very gradual.—Nov. 19 James L. Smith, a dentist of Waltham, Mass., was taking a Turkish bath and accidentally turned on the hot water instead of the cold in the shower. He was terribly burned, but his recovery is expected.—Nov. 5 a twelve-year-old girl in St. Louis was found on the street in a dazed condition. A physician revived her, and it developed

that she had gone to a dentist to have a tooth extracted, and after leaving his office was affected by the cocain in the local anesthetic used.—Nov. 15 Edward Dare, a dentist of Trenton, N. J., was opening a bottle of medicine, when it exploded and the fragments of glass cut him badly and he may lose the sight of an eye.—Nov. 1 Walter Derby, a dentist at Ballard, Wash., turned on the gas in the laboratory where he was working and forgot to light it. He inhaled the gas unconsciously until he was nearly overcome, and then ran out crying for help. He became unconscious at once, and four and a half hours' work failed to revive him, so a cylinder of oxygen was pumped into his lungs and he then slowly recovered.

FRACTURE OF THE MANDIBLE.—Faught condemns the use of the upper teeth as a splint and guide for maintaining the fragments in place with the aid of a bandage except in special cases, on the ground that it greatly limits the motion of the jaws and dooms the patient to a soft diet and to speechlessness for a period of five or six weeks. The commonly-used metal or vulcanite interdental splint is open to the same objection. The continued use for any length of time of a fixation bandage passing around the front of the chin may result in positive and permanent harm. The metallic cap splint, on the other hand, affords a certain and effective means of securing fixation, while possessing none of the objectionable features of other fixtures. The splint can be constructed and cemented into place in a few hours. The splint is swaged between die and counter-die, made from carefully prepared impressions, and may be made of gold, platinum, silver or German silver. Such a splint, if carefully constructed and inserted, will remain firmly in place until it ceases to be of service and is removed from the mouth prior to the dismissal of the patient. The splint introduces the least amount of foreign substances into the mouth and is contained entirely within the mouth, thus reducing the patient's discomfort to a minimum, at the same time affording a rigid support for the fractured bone, while permitting of free movement of the mandible with easy access to the oral cavity.

HYGIENE OF SMOKING.—J. Bamberger believes that in considering the dangers attendant upon the habit of using tobacco, two classes of smokers must be differentiated. One includes those who smoke cigars with the aid of a mouth-piece or, if not, are careful not to keep the end of the cigar saturated with saliva. This class also includes the pipe smokers. The other contingent comprises those who chew the end of the cigar or keep it wet constantly. The first class is much less apt to be affected by the absorption of the various products of the dry distillation of tobacco than the second. In the former, however, the smoke may give off its toxic constituents in the moist buccal cavity, whence they are swallowed with the saliva, or the smoke is drawn in with the inspired air and so diffused over the lungs. The second class in addition also swallow the nicotin which has been dissolved out of the tobacco by the saliva. They are therefore exposed to greater danger, and if indulgence in alcohol is also added the condition is aggravated. The "dry smokers" are found to suffer much

less from disturbances due to the use of tobacco than the "wet smokers," and he would recommend that this precaution should always be insisted upon. The suggestion that a bit of cotton saturated with a solution of iron chlorid be placed in the mouthpiece of a cigar-holder he fully recommends, and claims that a certain quantity of harmful products are thus rendered innocuous.

"How Often, Doctor?"—This is the stock question with the patient when the dentist suggests a little more effort, time and care in the matter of cleansing the teeth. "As often as necessary," is the stock answer. This, however, is indefinite, therefore unsatisfactory to people who do things by rule when they do them at all. The average patient must be pinned down to routine, otherwise the good work is done only with reference to his personal convenience.

We have in mind a good physician who never gave his patients any working margin. His theory was that the patient could not be trusted, whether with medicine or with the time for taking it. "One teaspoonful every hour," meant that quantity in that time, no more, no less. The patient followed directions to the letter, or his caretakers for him, with the result that effects were obtained, and the doctor was put down as "an exact man; no guesswork about him." Some men are cut out to "boss;" the great majority are built to be told what to do and when to do, and how it shall be done.

"How often shall I brush my teeth, Doctor?" was asked of a fellow practitioner, as it frequently has been asked of us all.

"As often as you say your prayers," was the answer.

"I'm afraid I'll neglect them if I adopt that rule."

"Then brush them as often as you look toward Mecca."

"How often should I do that?"

"Five times a day; first thing in the morning, the last thing at night, and once after each meal."

"Not oftener than that?"

"I said five times; and I mean religiously each time."

That rule works where *"about* five times" would fail utterly.

Another professional friend tells his patients: "Never let your brush get dry."

"Keep it in water, Doctor?"

"No; in use!"—*Dent. Off. and Lab.*

Marriages.—Walter Adams, a dentist of Decatur, Ill., was married to Miss Charlotte Clark of Indiana, Pa., Nov. 15.—William H. Bolton, a dentist of St. Louis, was married to Mrs. Amy Cuppage of St. Louis, Oct. 9.—Frank W. Brandow, a dentist of Pittsfield, Mass., was married to Miss Louise Engel of Pittsfield, Nov. 14.—Carrie Brooks, a dentist of Audubon, Ia., was married to Mr. D. W. Wood of Audubon, Nov. 1.—J. M. R. Canfield, a dentist of Frankfort, Ind., was married to Miss Lola Cheney of Antioch, Ill., Nov. 21.—L. G. Corzilius, a dentist of Columbus, O., was married to Miss Anna Stickelmeyer of Columbus, Oct. 18.—Clarence O.

Dodson, a dentist of Greentown, Ind., was married to Miss Rose Miller of Elkhart, Nov. 1.—Phelps Freer, a dentist of Cleveland, O., was married to Miss Cicely Bishop of Cortland, Nov. 22.—A. J. Goodrich, a dentist of Gerard, O., was married to Mrs. Retta Stacy of Poland, Nov. 1.—W. A. Goslee, a dentist of Auburn, Neb., was married to Miss Bessie Leach of Auburn, Oct. 29.—Herbert Hall, a dentist of Reno, Nev., was married to Miss Maud Gill of Reno, Nov. 2.—F. D. Hasbrouck, a dentist of Weston, Ore., was married to Miss Maude Burdic of Genesee, Idaho, Sept. 12.—LeRoy Hemsworth, a dentist of Marathon, Ia., was married to Miss Frances Butts of Montezuma, Nov. 1.—R. A. Hudson, a dentist of Fremont, O., was married to Miss Mary C. Hill of Detroit, Oct. 31.—Wiley Lamb, a dentist of Casey, Ill., was married to Miss Cora Lee of Martinsville, Nov. 12.—Herman Hill Mobley, a dentist of Gordo, Ala., was married to Miss Tennie Aderholdt of Atlanta, Ga., Nov. 31.—G. R. Moody, a dentist of South Bend, Ind., was married to Miss Lillian Turner of Goshen, Nov. 12.—Ernst Neitzel, a dentist of Horicon, Wis., was married to Miss Bertha Werblow of Horicon, Nov. 23.—Max Page, a dentist of Valparaiso, Ind., was married to Miss Nellie Grise of Mishawaka, Oct. 28.—Charles F. Rabell, a dentist of New York, was married to Miss Irene D. Whiting of Chicago, Nov. 8.—W. Marcus Randall, a dentist of Louisville, Ky., was married to Miss Zada Gaines of Covington, Nov. 4.—Victor J. Swanson, a dentist of Jamestown, N. Y., was married to Miss Olga C. Anderson of Jamestown, Nov. 2.

BRIDGE ATTACHMENT.—I note in the October DIGEST, page 1056, a description of a bridge attachment by pin and inlay to the cuspid tooth, quoted from the *Northwestern* and demonstrated by Dr. Edna M. Thompson. This is a perfectly practicable and a valuable method of attachment to the cuspid tooth, and sometimes it may be applied to a central incisor as well. I have been making this appliance for more than fifteen years, generally but not always using the hollow post. On Oct. 11, 1890, I made such an attachment to the right upper cuspid to carry a lateral incisor for a lady in Chicago. It was in place ten years later and I have little doubt it is doing service today. I have used this method often for carrying a lateral incisor, also for a bridge from cuspid to cuspid or from cuspid to molar. In March, 1902, I think, I gave a clinic in St. Louis, attaching a lateral to cuspid in the mouth of the young lady assistant of Dr. Wick, and I gave a table clinic of this method at Asheville, at the National Association, 1903.

The hollow post has certain advantages over the solid. First, the insertion of a fine pointed instrument into the post gives a convenient handle in the manipulations necessary. Second, should occasion ever arise for its removal the hollow is a convenient guide for a round bur, making the operation a simple one. The modus operandi of making the attachment is briefly this: Get the length of the post, letting it fit easily into the root of the tooth. A hole is punched into a piece of thin, pure gold, that is cut slightly large for the inlay (or overlay). These are tacked together with

a bit of 22-k. solder. The edges of the gold are nicked in several places to provide for easy adaptation. Then with the piece in position the gold is burnished to the lingual face, and somewhat around to the approximal surfaces of the tooth, and first one side and then the other is fluxed and stiffened with a 20-k. solder. Doing this gradually, step by step, a very accurately fitting overlay can be made, so that when the piece is finally in place there is only the slightest film of cement beneath. By having the overlay extend well around as described, so that it goes on with a slight "pinch," we get one of the most perfect abutments imaginable.—GARRETT NEWKIRK, Pasadena, Cal.

DENTISTRY, ANCIENT AND MODERN.—In the *Nuova Antologia* (Rome) is a curious article by Ernesto Mancini on "Teeth and Dentists in Ancient Times," with a number of illustrations of dental work among the ancients from museum specimens. The first mention of tooth-extracting in literature seems to be by Cicero, who names Æsculapius (the third) as the inventor of purges and the art of extracting teeth, some thirteen hundred years before Christ. Hippocrates, four centuries before Christ, wrote much about the care of the teeth, and a tomb at Tanagra, of about that period, furnished a set of false teeth. The collector of this relic has also found in Greek tombs teeth filled with gold. But before Greece, dental art flourished in Assyria, in Egypt, and in Phenicia, and from there the art reached the Etruscans. Benzoni asserts that he has found artificial teeth of sycamore wood attached by gold wire to sound teeth of mummies, and also in mummies from Thebes decayed teeth filled with gold so well that the metal adhered perfectly to the ivory. Other authorities deny this or claim that the art, if known, was not practised on account of religious objections. Various public and private collections have specimens of ancient dental work. The illustrations given are of Phenician teeth bound together with gold wire, gold teeth in the Etruscan museum, and the Bruschi-Falgari museum of Corneto, Italy, and a specimen that is practically "bridge-work" three thousand years old, found at Cerveteri, and now in the Castellani private museum. The museum of Pope Julius at Rome has a skull with a plate fitting over three sound teeth and having a compartment for a false tooth. In the museum at Florence is perhaps the oldest specimen of dental work in Italy—a skull with the incisors bound with a gold band, and dating from the fifth century B. C., according to the pottery found in the same Tarquinian tomb. Dentistry declined in Europe after the early centuries of the Christian era, and St. Louis of France is said to have had but a single tooth left at his death, while Charles the Bold was recognized dead on the field of Nancy by the gaps in his set of teeth. The Arabs kept up the best Greek practice, and late in the sixteenth century dental protection became common in Europe. Paré, the physician of Charles IX, was an expert dentist, and the first to transplant living teeth successfully. He filled teeth with cork and lead, reserving gold for royal mouths. Toothbrushes did not come into use until the eighteenth century, and princesses such as Marie Josephine of Saxony in 1747 had their special tooth-polishers as they had their barbers and dancing-masters.

D. HOWARD CROUSE,

Late Editor "Dental Digest."

Born August 13th, 1873. Died January 3rd, 1906.